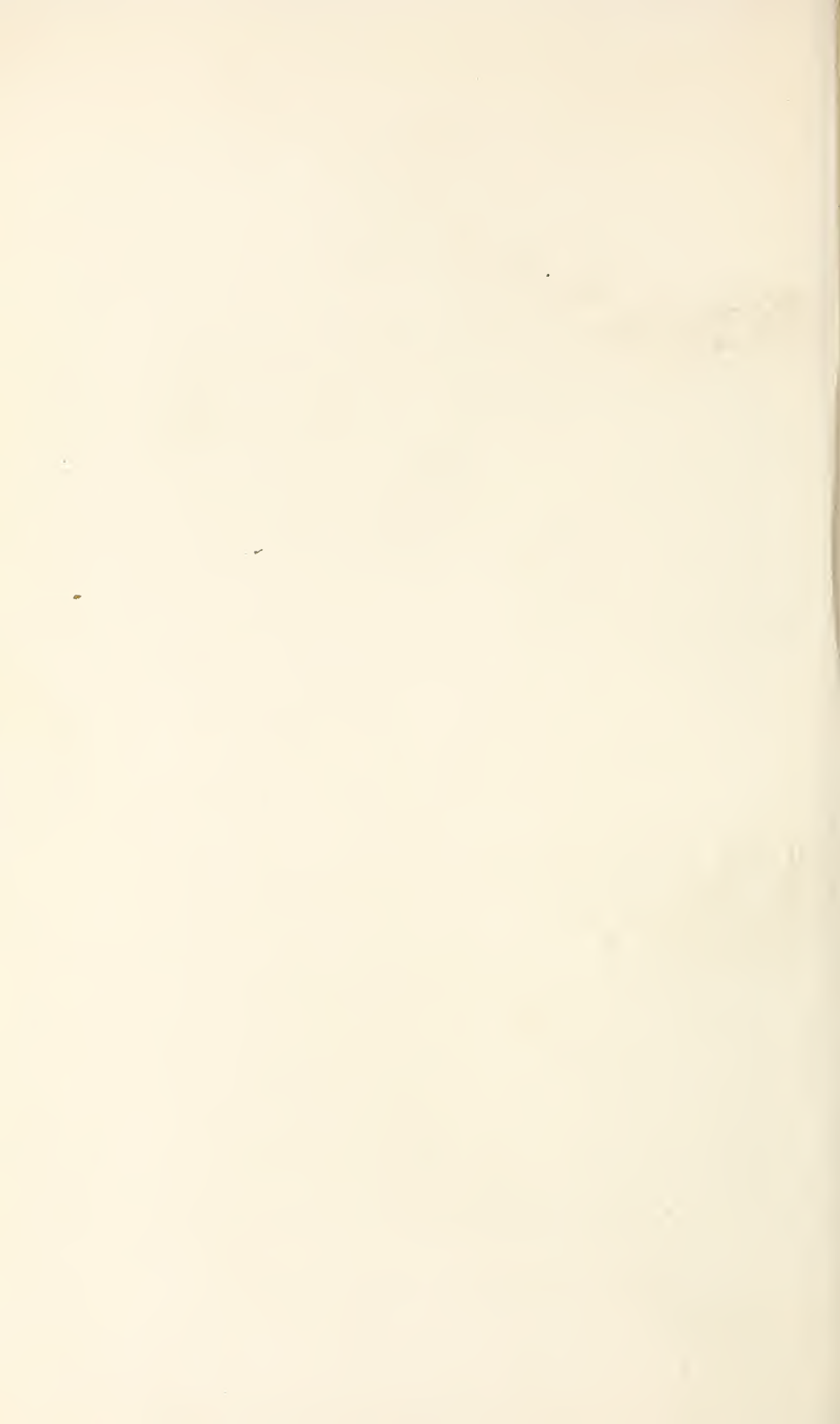


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U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF PLANT INDUSTRY—BULLETIN NO. 68.

B. T. GALLOWAY, *Chief of Bureau.*

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# NORTH AMERICAN SPECIES OF AGROSTIS.

BY

A. S. HITCHCOCK,

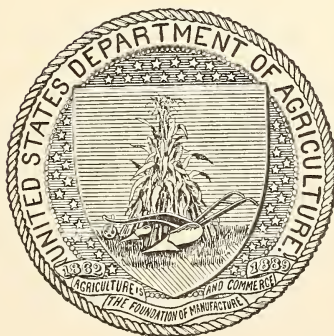
SYSTEMATIC AGROSTOLOGIST IN CHARGE OF HERBARIUM.

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GRASS AND FORAGE PLANT INVESTIGATIONS.

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## PREFACE.

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For several years the specimens of grasses in the National Herbarium have been accumulating at a rapid rate. In order to classify our knowledge of this mass of material, bring it up to date, and make it available for other workers along these lines, it has been thought desirable to issue from time to time monographs treating of the larger genera. In conformity with this plan the following monograph of the genus *Agrostis* has been prepared by Mr. A. S. Hitchcock, of this office. While pursuing his investigations along economic lines, which have taken him into all parts of the United States, Mr. Hitchcock has taken field notes which have aided him in solving the taxonomic problems. Realizing the necessity of consulting the type specimens, many of which are in foreign herbaria, advantage was taken of his presence in Europe while investigating certain economic problems to visit the larger herbaria and take notes upon these original specimens, and thus be the better able to solve the nomenclatorial problems.

The genus *Agrostis* comprises about 100 species, distributed over both hemispheres, but mostly in temperate regions. Many of them are forage grasses, and a few are cultivated for this purpose. The most important of these is redbtop (*A. alba*) or fiorin, as it is called in England. In some parts of this country it is called herd's grass. This is a valuable grass for wet meadows or pastures and also does well when mixed with other grasses upon drier soil. Certain forms or subspecies of this are used as lawn grasses. *A. alba vulgaris*, being small and fine, is especially useful for this purpose. One form of this, known as creeping bent, has decumbent rooting stems, which aid it in forming a thick, firm sod. Creeping bent is especially useful in the vicinity of Washington and similar localities where the conditions are not suited to either Kentucky bluegrass or Bermuda grass, being too far south for the former and too far north for the latter. Another species (*A. canina*) is used for lawns under the name of Rhode Island bent. Much of the seed sold under this name is *A. alba vulgaris*. The awned form of the last is difficult to distinguish from *A. canina* except by the presence of the palet.

Acknowledgment is made to the directors of the various herbaria in this country and Europe for numerous courtesies extended to Mr. Hitchcock, who, in some cases, was allowed to take for deposit in the National Herbarium portions of the type specimens.

W. J. SPILLMAN,  
*Agrostologist.*

OFFICE OF GRASS AND FORAGE PLANT INVESTIGATIONS,  
*Washington, D. C., November 8, 1904.*

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## NORTH AMERICAN SPECIES OF AGROSTIS.

## INTRODUCTION.

The present paper is an attempt to classify our knowledge concerning one of our most perplexing genera of grasses. It deals chiefly with those species found north of Mexico, but includes a few notes on the Mexican species. The preparatory study naturally divided itself into two rather distinct lines—the classification of the species, or taxonomy, and the history of the species, or nomenclature. Each line presents difficulties, a few of which are discussed below.

## TAXONOMY.

The division into species is largely subjective, and different people arrive at different results with the same material. There is a large amount of material in the National Herbarium, and in addition I have had the privilege of examining that in all the larger herbaria in this country and in Europe. The National Herbarium is by far the richest in this respect, disregarding for the moment the historical aspect. It is true that specimens representing the extremes of certain groups seem distinct, but an examination of a large suite of specimens often shows that the extremes are connected by numerous intermediate specimens. Some of these perplexing questions I have been able to answer by field observations. Some of my conclusions based on herbarium specimens may be modified by further study in the field.

On account of the simple structure of the spikelet there are few salient characters upon which to base classification. It is easy to set off the subgenus *Podagrostis* by the prolongation of the rachilla. The primary divisions of *Euagrostis*, based upon the presence or absence of a 2-nerved palet, seem also to be definite. I have used vegetative characters sparingly, as there is evidently great variation in the same species. The presence or absence of a creeping rootstock to separate the *pallens* group and the *exarata* group is satisfactory, but unfortunately much herbarium material does not show the complete base of the plant.

Considerable weight has been given by some authors to the awn as a character. After a careful examination of much material I believe



it can not be relied on in such large groups as *A. alba*, *A. hiemalis*, and *A. pallens foliosa*. In some other cases it is usually a good character and can be depended upon in connection with other characters. I think the insertion of the awn is of more importance than its length. Likewise the palet varies considerably in the same species or even in the same plant. In some cases I have been forced to fall back on such unsatisfactory characters as the shape of the panicle or the length and arrangement of its branches. Even with the classification as finally presented there are a few intermediate specimens, but such are relatively rare. In any attempt to separate the large groups, such as *A. alba* or *A. hiemalis*, into smaller and definite species I was invariably confronted by such a large number of intermediates that I was convinced that no such separation could be made.

This leads me to speak of a point which I have attempted to emphasize. There are two classes of synonyms—those based upon the same type (typonyms) and those based upon different types but nevertheless considered by the author to be the same species. Authors do not often indicate this difference in their monographs. In bringing together the synonyms I have indicated briefly the basis upon which I have made the union. I hope this will aid others who differ from me in their ideas upon the limitations of the species, and who may wish to readjust the forms, to do so without finding it necessary again to consult the original sources.

#### NOMENCLATURE.

I have intended to follow the recommendations of the recent Code of Botanical Nomenclature, prepared by the nomenclature commission appointed by the Botanical Club of the American Association for the Advancement of Science (1904). One of the important canons is that so far as possible species should be based upon definite specimens. Much confusion has arisen from the fact that some authors have described what they supposed were new species without becoming acquainted with the species already published. There is some excuse for this, for the descriptions may have been published in inaccessible works and the older types are deposited for the most part in the European herbaria, which few of those describing grasses have taken the trouble to visit.

During my study of the genus *Agrostis* I have fortunately had the opportunity of visiting all the large European herbaria and have been able to examine nearly all the type specimens of our North American species. The specimens of this genus were examined in the following herbaria:

*London.*—The herbarium at the British Museum, in the natural history section at South Kensington, in charge of Mr. James Britten. Walter's herbarium is deposited here. The plants are mostly fragmentary and are mounted in a large folio volume. There are a few



grasses, but mostly without names, and I found no types of *Agrostis* (*Cornucopie* Walt.). Other collections of importance to American botanists are those of Sloane and Gronovius. The largest collection of plants in the world is the herbarium of the Botanical Garden at Kew. One other important collection is the Linnæan herbarium at the rooms of the Linnæan Society.

*Paris*.—The most important herbarium is that at the Museum of Natural History in the Jardin des Plantes. In this herbarium are to be found the types of Lamarck. The very important Michaux herbarium is kept separate. There are two other large herbaria at Paris, those of Cosson and Drake, but there are few types from America.

*Geneva*.—There are four large herbaria here—that of De Candolle, at his residence; the Barbey herbarium, in one of the suburbs; the herbarium of the university, in charge of Professor Chodat, and the herbarium of the botanical garden, in charge of Mr. Briquet.

*Vienna*.—Here are the herbaria at the Hofmuseum, in charge of Doctor Zahlbruckner, and at the Botanical Garden, in charge of Doctor Wettstein.

*St. Pölten*.—This town is about one hour's ride west of Vienna. Here is the important herbarium of Doctor Hackel,<sup>a</sup> the eminent agrostologist.

*Prague*.—The herbarium at the Botanical Garden, where are deposited the types of Presl, is in charge of Doctor Beck.

*Berlin*.—The herbarium of the Botanical Garden is in charge of Doctor Engler. The Willdenow plants are kept separate.

*Copenhagen*.—The herbarium at the Botanical Garden is in charge of Doctor Warming. This collection is especially rich in arctic material.

*St. Petersburg*.—There are two large herbaria here—one at the Botanical Garden and one at the rooms of the Academy of Sciences. At the latter is deposited the Trinius herbarium, which is kept separate. The plants of the Trinius collection are unmounted and are kept in large species covers. The director, Doctor Litwinow, very kindly allowed me to take portions of the specimens for deposit in the National Herbarium when the material was sufficiently abundant.

In examining the types I took photographs and in some cases was allowed to take a few spikelets; but in this genus the spikelets are likely to be of less importance than the photographs showing habit and the notes concerning critical characters.

The types in America are more easily accessible. A large number are in the National Herbarium, including those of Vasey and of Scribner. The herbarium of the Philadelphia Academy of Natural

<sup>a</sup> Doctor Hackel has since removed to Graz.

Sciences contains the types of Muhlenberg and the types or duplicate types of Nuttall. The types of Elliott are at the College of Charleston. I have not seen these, but they were examined and reported upon by Mr. Elmer D. Merrill (U. S. Department of Agriculture, Division of Agrostology, Circular No. 29, 1901). A few types of *Agrostis* are in the Torrey herbarium at the New York Botanical Garden and in the Gray herbarium at Cambridge.

In discussing the types under each species I have indicated where the type specimen is to be found, and in the few cases where I have not seen this the fact is so stated.

As previously stated, I have followed the rules as published in the recent Code of Botanical Nomenclature. In applying these to the selection of type specimens I have given my reasons in each case. By adhering to these rules I have been able to present the historical data in a more satisfactory manner than by assuming the idea of a species as indicated by evolutionary development. It not infrequently happens that this idea gradually changes because authors do not have a definite type in mind. The result is often similar to that reached by a child in using a copy book, where he each time looks at the last line written instead of at the original. Again, there has been confusion because an author has wished to separate a composite group into what he thinks are species. He retains the old name for one portion and gives new names to the other portions. If he has not consulted the type he may have applied the original name to the wrong division, as the original description may not have mentioned the characters which he uses in making the separation.

#### PLATES.

So far as possible the drawings were made from type specimens. The artist has faithfully reproduced all the technical details of the spikelets as shown in the particular specimen at hand. But it has not been practicable to show the variation in the characters in different specimens, although it is largely upon these variations that I have based my judgment of specific differences.

#### SPECIMENS LISTED.

In general the specimens listed are confined to those deposited in the National Herbarium. In a few cases, where the species is rare, or on account of some peculiarity, specimens from other herbaria are mentioned. It was not thought advisable to give a complete list of specimens, but only enough to illustrate the distribution. In the case of species of limited distribution a proportionately larger number, or perhaps all, are given.

## HISTORY OF THE GENUS.

The genus was established by Linnæus in the first edition of the *Genera Plantarum* (p. 19, No. 54, 1737), though the name was mentioned without description a little earlier (*Syst. Nat.*, ed. 1, 1735). The description—"Cal. gluma uniflora, bivalvis, acuminata. Cor. bivalvis, acuminata, vix longitudine calycis, altera majore aristata"—is retained through all the editions of this work, except that in the sixth edition "aristata" is omitted, apparently inadvertently. It is based on "Scheuch., 3: 11.9." This citation, which follows the name in the first edition, is dropped in the fifth edition (No. 74, 1754).

Scheuchzer's Plate III, figure 11, cited by Linnæus, includes three figures, *A*, *B*, and *C*. The first two, *A* and *B*, refer to the description given on page 146, and are two figures of the same plant, *A* being a cluster of four spikelets, and *B* a single flower. The plant here described is *Stipa calamagrostis* Wahl. Plate III, figure 11, *C*, referred to on page 148 of the publication mentioned, is *Milium lendigerum* L. (*Gastridium australe* Beauv.). The second citation given by Linnæus from Scheuchzer, Plate III, figure 9, includes five figures, *A*, *B*, *C*, *D*, and *E*. The first two, *A* and *B*, accompany the description on page 139, "Arista articulata et recurva prodeunte ex alterutrius glumæ dorso, prope ejusdem basin." There are two forms described under this according to Trinius (*Clavis Agrostographiæ*); the first, of which the diagnosis is "Gramen parvum, paniculatum, alpinum, panicula spadicea, aristatum," is *Agrostis alpina* Scop., and the second, "Gramen paniculatum, capillaceo folio, locustis parvis spadiceo-fuscis, aristatis," is *A. rupestris* All. Figure *B*, which represents a single flower, shows a palet, which neither of the above-mentioned species possesses, but too much weight must not be attached to this discrepancy, as in many cases the presence of a palet seems to have been assumed. The third figure, *C*, is, according to Trinius, *A. canina*, while *D* and *E* refer to *A. vineale* With.

Linnæus seems to have included these various forms in one genus because they all had small one-flowered spikelets with a projecting awn. The statement "cor. bivalvis" applies only to the first-cited plants, *Stipa calamagrostis* and *Gastridium*, yet the other figures show a palet, and Linnæus probably examined the plates rather than the plants.

Although Linnæus's idea of the genus changes in the *Species Plantarum*, the text of *Agrostis* in the later editions of the *Genera* remains the same, although the fifth and sixth are published after 1753.

In the Species Plantarum (1: 61, 1753), Linnæus describes the following species:

*Aristatæ.*

1. *A. spica-venti*=*Apera spica-venti* Beauv.
2. *A. miliacea*=*Oryzopsis miliacea* Richt.
3. *A. arundinacea*=*Deyeuxia sylvatica* Kunth.
4. *A. rubra*. [Not identifiable. See note under *A. borealis*.]
5. *A. canina*.
6. *A. paradoxa*=*Oryzopsis paradoxa* Nutt.

*Muticæ.*

7. *A. stolonifera*.
8. *A. capillaris*.
9. *A. alba*.
10. *A. minima*=*Mibora verna* Beauv.
11. *A. virginica*=*Sporobolus virginicus* Kunth.
12. *A. indica*=*Sporobolus indicus* R. Br.

In the tenth edition of the Systema (2: 872, 1759) the following are added:

A. *A. sepium*. "A. petalo exteriori arista terminali recta stricta longitudine ipsius floris, panicula patula." This species was not taken up in later works and its identity is uncertain. No locality or references are given.

B. *A. interrupta*=*Apera interrupta* Beauv.

C. *A. calamagrostis*=*Stipa calamagrostis* Wahl.

D. *A. cruciata*=*Chloris cruciata* Sw.

E. *A. radiata*=*Chloris radiata* Sw.

*A. paradoxa* is transferred to *Milium*.

In the second edition of the Species (1: 91, 1762) no change is made except to omit *A. sepium* and (in the Appendix, 2: 1665, 1763) to add *A. sylvatica* (= *A. alba* L. teratological form).

Six more species are added in the Mantissa Plantarum (1: 30, 1767):

*A. bromoides*=*Stipa aristella* L.

*A. australis*=*Gastridium australe* Beauv.

*A. serotina*=*Diplachne serotina* Link. Transferred from *Festuca* Sp. II, although the spikelets are described as 4-flowered.

*A. matrella*=*Zoysia pungens* Willd.

*A. pumila*=*A. alba* L.

*A. mexicana*=*Muhlenbergia mexicana* Trin.

All the species mentioned appear in the twelfth edition of the Systema Naturæ (1767) except *A. sepium* and *A. matrella*.

Historically it is rather difficult to establish the type of the genus. Of the twenty-four species described by Linnæus only seven would be referred to the genus *Agrostis* as now limited. The first figure cited in the original description of the genus refers to *Stipa calamagrostis*, which was not included in those described in the first edition of the Species Plantarum, but was added later. In the Species Plantarum



there is nothing to indicate what Linnæus considers the type of his genus.

Later writers have segregated various species, and the name *Agrostis* has been applied to what was left.

Adanson (Pl. Fam., 1763) changes the name. His *Agrostis* based upon Scheuch. 57 is *Saccharum*, while he gives a new name, *Vilfa*, to Linnæus's *Agrostis*, founded on Bauhin's "*Gramen caninum supinum minus*," which is *A. stolonifera* L. (i. e., *A. alba* L.) according to Trinius. Adanson also takes out Linnæus's first species of *Agrostis* as the type of *Apera*; the tenth species, as type of *Mibora*.

Walter (Fl. Carol., 1788) describes three new species under the genus *Cornucopiæ*, the chief generic character being the absence of the palet, "*cor. 1-valvis*." These are *C. hiemalis*, *C. perennans*, and *C. altissima*. He retains the name *Agrostis* for *A. indica* and *A. virginica*.

Michaux (Fl. Bor. Am., 1803) gives the name *Trichodium* to Walter's genus *Cornucopiæ* and describes the first two species under the new names *T. laxiflorum* and *T. decumbens*. He omits the third. He retains *Agrostis* ("*cal. 2-valvis, gluma major*"), describing:

- A. indica* L.=*Sporobolus indica* R. Br.
- A. juncea*=*Sporobolus junceus* Kunth.
- A. dispar*=*A. alba* L.
- A. aspera*=*Sporobolus asper* Kunth.
- A. lateriflora*=*Muhlenbergia mexicana* Trin.
- A. racemosa*=*M. racemosa* B. S. P.

The seventh edition of the *Genera Plantarum*, by Reichard, 1778, has "*Cal. gluma uniflora, bivalvis acuminata, corolla paulo minor*," which is followed in the eighth edition (Schreber, 1789) and ninth edition (Haenke, 1791). In the tenth edition (Sprengel, 1830) we find the characters changed to agree more nearly with the modern *Agrostis*: "*Cal. bivalvis, acutiusculus, muticus, corollam æquans vel superans. Cor. bivalvis, callo sæpe insidens aut basi pilis brevibus suffulta; valva altera sæpe obsoleta aut nulla, altera arista vel mutica*."

Jussieu (Gen. Pl., 1789) retains the old description, "*Calix [corolla of Linnæus] 2-valvis gluma major*."

Without taking up each authority we may glance at a few of the handbooks to note the tendency to change into what might be called the modern idea of the genus.

Gmelin (Syst. Veg., 1: 168, 1796) describes forty-one species under the limitation "*Cal. 2-valvis, 1-florus, corolla paulo minor*."

Willdenow (Spec. Pl., 1: 361, 1797) describes forty-six species. The genus characters are as given by Gmelin; that is, that the empty glumes are two, and a little shorter than the single flowering glume, which applies better to *Sporobolus*.

Persoon (Syn. Pl., 1805) agrees with his predecessors, but says "cor. 2-valvis," omitting the statement that the "calyx" is shorter than the "corolla."

Willdenow (Enum. Pl., 1809) keeps *Agrostis* and *Trichodium* separate. *Agrostis* is described as "Cor. 2-valvis, calyce plerumque minor, valvula major aristata seu mutica."

Brown (Prod., 1810) separates the species having the flowering glume awnless and longer than the empty glumes under a new name, *Sporobolus*, describing three species, one of which is *Agrostis indica* L., but he includes *A. virginica* L. in *Agrostis*. The distinction is not clear and Brown states that the genus *Agrostis* is artificial.

Beauvois (*Agrost.*, 1812) describes *Agraulus* with "Glumæ palea longiores. Palea apici emarginata, infra medium aristata" to include "*Agrostis canina* L. and *A. alpina* L.," etc.; *Trichodium* with one palet, which is awnless; *Vilfa*, following Adanson in applying the name to species with two palets shorter than the glumes. His genus *Agrostis* is founded on *A. rubra* L., of which he gives a plate, showing a small palet with four teeth. This is the chief difference between *Agrostis* and *Agraulus*. Beauvois intends to include in *Agrostis* species with two palets and an awn. He recognizes *Sporobolus* R. Br., *Muhlenbergia* Schreb., and *Apera* Adans.

Pursh (*Flora*, 1814) describes fifteen American species, including species now referred to *Sporobolus* and *Muhlenbergia*, but under the generic diagnosis "Cal. 2-valvis; valvis acutis corolla brevioribus. Cor. 2-valvis." Although the genus is described as having the calyx shorter than the corolla, certain species (e. g., *A. stricta* and *A. vulgaris*) are described as having the corolla (flower) shorter than the calyx. The same is true of *Muhlenberg* (Gram., 1817) and of *Elliott* (Sketch, 1816).

Koeler (Gram., 1802) gives a consistent description of the genus, inasmuch as he states that the corolla may be smaller, equal to, or larger than the calyx, and that the awn when present may be terminal, dorsal or attached near the base. Nuttall (Gen., 1818) also makes the generic description agree with the species included.

Roemer and Schultes (*Syst. Veg.*, 1817) describe ninety-seven species of *Agrostis*, but they unite several groups or sections under the generic characters: Corolla larger or smaller than the calyx, stipitate at base with one or two fascicles of hairs, larger valve awned or awnless. The sections are *Vilfa* (of Beauvois, which is our *Agrostis*, 62 species), *Achnatherum* (including *A. calamagrostis*, *A. sobolifera* Muhl., etc., 5 species), *Agrostis* (which includes *A. toluensis* and *A. virescens* H. B. K., 8 species), *Sporobolus* (including *S. indica*; but some of our species are included under section *Vilfa*), *Apera*, and *Cinna*. Besides these there are described sixteen species of *Tricho-*

dium, which includes the species with 1-valved corolla, either awned (*Agraulus* Beauv.) or awnless (*Trichodium*).

Sprengel (*Syst. Veg.*, 1825) describes eighty-five species. He arranges them thus:

\* Corollæ muticæ: valva calycis inferior minor: *Vilfa* Adans. Includes *A. alba* and its allies, *Sporobolus indica*, etc.

\*\* Valva corollæ altera minutissima vel obsoleta, *Trichodium* Mx.

† Corollæ aristatæ. *A. canina*, etc.

†† Corollæ muticæ. *A. laxa* Schreb. (*A. hiemalis* Walt.) and its allies.

\*\*\* Valvæ corollinæ subæquales, altera aristata.

† Sine rudamento alterius floris. Calycis corolla plerumque breviores.

†† Cum rudimento cylindrico alterius corollæ. *Apera* Beauv.

Kunth (*Enum. Pl.*, 1833) describes ninety species of *Agrostis*. In this work the genus is limited about as at present, so far as his "Species genuinæ" are concerned. He includes under "Species anomalæ" *Apera spica-venti* and *A. interrupta*, and under "Species dubiæ" a number of diverse forms. *Sporobolus*, *Cinna*, *Muhlenbergia*, etc., are kept separate.

Trinius (*Fund.*, 1820) lays the foundation for the modern conception of the genera of grasses. *Agrostis* is characterized as having the calyx longer than the corolla, the latter 2-valved, the lower valve awned or awnless, the upper often small or obsolete. He recognizes three divisions:

(a) Upper valve distinct. *Agrostis*, *A. vulgaris*, etc.

(b) Upper valve minute or obsolete, awnless. *Trichodium*, *A. elegans*, etc.

(c) As above, but awned. *Agraulus*, *A. canina*, etc.

*Muhlenbergia*, *Cinna*, and *Vilfa* are recognized, the last being the same as *Sporobolus* R. Br. *Vilfa* Adans. is based on *A. stolonifera* L., but Trinius uses this name for *Sporobolus* R. Br.

A perusal of the history of the genus *Agrostis*, as accepted by modern authors since Trinius, shows that the name has not been applied in accordance with any rule.

If the name goes with the first plate cited when the genus was established in 1737, it should be applied to what is now *Stipa calamagrostis*, which would become the type.

If we start with the first edition of the *Species Plantarum* and take the first species described, *Apera spica-venti* Beauv. becomes the type.

If we take the first of the species described in the *Species Plantarum* which has not been removed as the type of a monotypic genus, *Oryzopsis miliacea* Richt. becomes the type of *Agrostis*.

If we take the first identifiable species of Linnæus which has not been segregated under some other genus, *A. canina* becomes the type.

If we accept the genus as indicated in the *Species Plantarum* and follow its subdivision we find that Adanson split up the genus, applying the name *Vilfa* to our *Agrostis* and *Agrostis* to *Saccharum*; then *Agrostis* would disappear, as *Saccharum* is a good genus.



Walter appears to be the first author who separates the species with no palet, wrongly referring them to Cornucopiæ. Michaux gives a new name, *Trichodium*, to this group, retaining the name *Agrostis* for the species with a palet. This segregation would make *A. stolonifera* the first Linnæan species to fall in *Agrostis*.

It would seem best to accept the evolution that has actually taken place and follow Trinius and others in applying the name, as has been done by all modern authors, including Bentham and Hooker (*Gen. Pl.*, 1883) and Engler and Prantl (*Pflanzenfamilien*).

Following the provisions of canon 15, section *f*, of the recent Code of Botanical Nomenclature (*Bul. Torr. Bot. Club* 31: 249), I have selected as the type species of the genus *Agrostis*, *A. alba* L.

### GENERIC DESCRIPTIO

Spikelets small, 1-flowered, hermaphrodite, arranged in open or contracted panicles; empty glumes 2, equal or somewhat unequal, persistent (or sometimes with age deciduous from the pedicel), usually acute, sometimes acuminate or awn-pointed, carinate, usually scabrous on the keel and sometimes on the back; flower articulated above the empty glumes, the rachilla not produced except in section *Podagrostis*; flowering glume shorter than the empty glumes or sometimes nearly as long, thinner in texture than these, awnless, or dorsally awned below the apex, often provided with a minute tuft of hairs at base; palet two-keeled, smaller than the flowering glume, rarely of the same length, often a minute nerveless scale, or obsolete; stamens usually 3; styles distinct, stigmas plumose. Annual or perennial grasses, with culms glabrous, low or tall, erect, geniculate or creeping at base, cespitose or provided with running rootstocks; leaf blades flat or involute, usually scabrous; sheaths usually striate, often scabrous; panicle terminal, rarely also from axillary branches, open and diffuse, with capillary branches, or more or less contracted, or even spikelike.

*Sporobolus* differs in having the flowering glume and palet of a firmer texture and longer than the empty glumes.

*Muhlenbergia* differs in having the flowering glume as long or longer than the empty glumes and the awn when present terminal.

*Calamagrostis* differs in having a conspicuous tuft of hairs at base of flowering glume, and in having larger spikelets and stouter culms. The difference between these two genera is, however, quite artificial. In *Agrostis hallii* the hairs at the base of the flower are as long as in *Calamagrostis*, but the culms are not so stout.

*Cinna* differs in its 1-nerved palet and single stamen.

*Apera* differs in having the rachilla produced, the palet as long as flowering glume, the latter awned just below the apex.



*Agrostis*, section *Podagrostis*, connects those two genera, differing only in the absence of the awn and somewhat in habit.

## KEY TO SPECIES.

- Rachilla prolonged behind the palet.  
 Spikelets 3 mm. long, usually purple..... 1. *aequalis*.  
 Spikelets 2 mm. long, usually pale..... 2. *thurberiana*.
- Rachilla not prolonged behind the palet.  
 Palet evident, 2-nerved.  
 Palet as much as one-half the length of the flowering glume.  
 Panicle contracted or open, but not diffuse.  
 Panicle contracted and lobed or verticillate; empty glumes equal, 2 mm. long, scabrous on keel and back; flowering glume one-half as long. .... 3. *stolonifera*.  
 Panicle more open; empty glumes scabrous on keel, but smooth on back; flowering glume longer than in the preceding.  
 Plants erect or decumbent, but not provided with extensive stolons.  
 Plants of wide range; usually over 30 cm. in height ..... 4. *alba*.  
 Plants of alpine region; dwarf..... 5. *humilis*.  
 Plants provided with extensive creeping stolons, the leaves on these being short and spreading. Western ..... 6. *depressa*.  
 Panicle diffuse; plant low..... 7. *rosei*.  
 Palet about one-fourth the length of the flowering glume; panicle contracted ..... 8. *glomerata*.
- Palet wanting, or a small nerveless scale.  
 Flowering glume provided with a very slender awn about 5 mm. long. Delicate annuals.  
 Awn straight. California..... 9. *exigua*.  
 Awn flexuous. Southeastern States ..... 10. *elliottiana*.
- Flowering glume awnless, or short-awned. Perennials.  
 Plants spreading by rhizomes.  
 Tuft of hairs at base of flowering glume 1-2 mm. long ..... 11. *hallii*.  
 Tuft of hairs minute or wanting ..... 12. *pallens*.
- Plants tufted but not producing rhizomes.  
 Panicle narrow, usually a part of the lower branches spikelet bearing from the base.  
 Panicle strict, branches very short and appressed. A low caespitose plant. California ..... 13. *breviculmis*.  
 Panicle narrow but not strict. Some of the lower branches 2 cm. or more long. Group of *A. exarata*. Western.  
 Flowering glume with an exerted awn.  
 Outer glumes awn-pointed; panicle narrow and rather compact. .... 14. *microphylla*.  
 Outer glumes acute but not awn-pointed; panicle more open and verticillate ..... 15. *ampla*.
- Flowering glume awnless, or the awn included.  
 Panicle 5-30 cm. long; a taller plant of low altitudes.. 16. *exarata*.  
 Panicle short, 3-6 cm. long; a dwarf plant of high altitudes. .... 17. *rossæ*.

Rachilla not prolonged behind the palet.

Palet wanting, or a small nerveless scale.

Flowering glume awnless, or short-awned. Perennials.

Plants tufted but not producing rhizomes.

Panicle open, sometimes diffusely spreading; usually no short branches in lower whorls of branches.

Awn of flowering glume attached near the base ..... 18. *howellii*.

Awn, if present, attached at or above the middle of the glume.

Panicle very diffuse, with very scabrous capillary primary branches, these branching above the middle; spikelets clustered toward the ends of the smaller branches. In arctic and Alpine forms these characters are less plainly shown. In the subspecies *geminata* the branches are shorter and divaricate ..... 19. *hiemalis*.

Panicle open but not conspicuously diffuse; branches more or less capillary.

Flowering glume awnless. Occasional specimens are awned.

Plant delicate, 10-30 cm. high, growing at high altitudes; spikelets small, about 1.5 mm ..... 20. *idahoensis*.

Plants tall and often stout, mostly over 50 cm. high. In some forms of *A. perennans* the culms are lax and decumbent.

Panicle pyramidal, dark purple. Oregon and Washington.

..... 21. *oregonensis*.

Panicle elongated, oblong; lower branches several in distinct verticils, ascending. Pacific slope ..... 22. *schiedeana*.

Panicle pyramidal to elongated oblong, pale; branches more flexuous or drooping, not usually stiffly ascending. Eastern States ..... 23. *perennans*.

Flowering glume awned. Awnless individuals occur.

Spikelets 2 mm. long. Introduced ..... 24. *canina*.

Spikelets 2.5-3 mm. long.

Awn straight, included or slightly exerted ... 25. *melaleuca*.

Awn exerted, geniculate.

Branches of panicle nearly smooth; ligule 2-3 mm. long.

..... 26. *borealis*.

Branches of panicle very scabrous; ligule usually 5-8 mm.

long ..... 27. *longiligula*.

## DESCRIPTION OF SPECIES.

*Section 1. Podagrostis Griseb. in Ledeb. Fl. Ross. 4: 436. 1853. Flowering glume equaling the empty glumes; palet nearly as long as the flowering glume; rachilla prolonged behind the palet, naked or minutely pubescent.*

This section differs from *Agrostis* proper in having the rachilla prolonged, but agrees in habit. It differs from *Calamagrostis* in the absence of the callus hairs and in habit.

### 1. *A. æquivalvis* (Trin.) Trin.

*A. canina æquivalvis* Trin., in Bong. Mem. Acad. Sci. St. Petersburg, Ser. VI, 1: 171. 1832.<sup>a</sup> Veg. Sitcha. This is generally credited to Bongard, but in the preface to this article Bongard states that the grasses were worked up by Trinius, and the latter cites himself as authority for this variety in his *Agrostidea*. For the original description see *A. aenea* Trin. under *A. melaleuca*

<sup>a</sup> According to Mr. M. L. Fernald, who has seen the original signature cover of this publication at Kew, the date is given thereon as August, 1832.—P. L. RICKER.

Trinius suspects this variety to be a good species and points out the differences between this and *canina*.

The type specimen was collected at Sitka, Alaska, by Mertens in 1829, and is deposited in the herbarium of the Academy of Sciences at St. Petersburg. A part of the type specimen is in the National Herbarium. (Pl. I, fig. 2, A.)

In the original description no type is indicated, but the description is included in an article upon plants from Sitka, and the statement is made in the introduction that the plants were collected by Doctor Mertens. When the variety is raised to specific rank the author gives two localities—Sitka and Unalaska. The specimen in the National Herbarium is a single culm 30 cm. high, with a short decumbent base; culm leaves 2; panicle 4 cm. long, with the lower branch 2.5 cm. long, the branches bearing 2–3 spikelets near the end.

*A. aequivalvis* Trin. Mem. Acad. St. Petersb., Ser. VI. 6<sup>2</sup>: 362 (Agrestidea, II: 116). 1841. "Sitka, Unalaska, inter muscos (Mertens fil.)."

*Deyeuxia aequivalvis* Vasey, Contr. U. S. Natl. Herb. 3: 77, 1892. This binomial is generally credited to Bentham (Journ. Linn. Soc. 19: 91, 1881), but Bentham does not actually make this combination. He says, under the genus *Deyeuxia*: "In Achaeta Fourn., two Mexican species, the awn appears to be deficient, but all the other characters are those of the typical *Deyeuxia* with a hairy rachilla to which I would also refer the *Agrostis aequivalvis* Trin., forming Grisebach's section *Podagrostis*."

Culms tufted, slender, smooth, 30–60 cm. high. Blades narrow and upright, 1 mm. wide, somewhat scabrous, those of the stem only 1 or 2 and appressed, usually 4–6 cm. long; ligule semicircular, 2 mm. long. Panicle open, 5–15 cm. long; branches slender, somewhat scabrous. Spikelets about 3 mm. long, usually purplish; empty glumes equal, sharp pointed, minutely scabrous below tip of keel; flowering glume obtuse, about as long as empty glumes; palet nearly as long as glume; rudiment minutely pubescent, one-fifth to one-half the length of the flower. (Pl. I, fig. 2.)

DISTRIBUTION: Alaska to Labrador and the mountains of Oregon.

ALASKA: Sitka, *Mertens* (type); *Wright* 1579; *Piper* 4620; Unalaska, *Kellogg* 119; Helm Bay, *Flett* 2015; Yes Bay, *Howell* 1712, *Gorman* 92; Latouche, *Piper* 4621. VANCOUVER ISLAND: *Rosendahl and Brand* 121. OREGON: Paulina Lake, Crook County, *Leiberg* 588 (this agrees with the others, but the spikelets are only 2.5 mm. long). LABRADOR: *Allen* 22½ (in part).

## 2. *A. thurberiana*, sp. nov.

Culms tufted, slender, 20–40 cm. high, somewhat decumbent at base. Basal leaves rather numerous, the blades lax, light green, slightly scabrous, about 10 cm. long and 2 mm. wide; culm leaves 2 or 3, the uppermost about the middle of the culm, the blade only about 5 cm. long; ligule semicircular, 6 mm. long. Panicle narrow and lax, more or less drooping, 5–8 cm. long; branches few, slightly scabrous, 2–4 in each whorl, flower-bearing from about the middle. Spikelets green or pale, rarely purple, 2 mm. long; empty glumes equal, acute but scarcely pointed; flowering glume nearly as long as the empty glumes, obtuse, faintly 5-nerved; palet about 1.3 mm. long; rudiment usually about ¾ mm. long, minutely hairy; callus very minutely hairy.

The above description is based upon the type specimen. In other specimens the width of the leaves may be 2–4 mm. and the panicle may be as much as 15 cm. long; the palet varies from ½ to ¾ the length of the flowering glume.

*A. thurberiana* differs from *A. aequivalvis* Trin. in the wider, more numerous, and more lax leaves, smaller spikelets, shorter palet and pedicel, and the usually narrower and less spreading panicle.

The species was first mentioned as a nomen nudum in a list of grasses by Doctor Bolander: "*Agrostis Hillebrandii* (Thurb.), Sierras (Doctor Hillebrand). Little known as yet."—Bolander, Trans. Calif. State Agric. Soc. for 1864 and 1865 (1866). The name also appears in the Index Kewensis as a



synonym of *A. aquivalvis* Trin. As the name was first mentioned as a nomen nudum and later as a synonym it seems advisable to publish the species under a different name.

The type specimen of *A. thurberiana* was collected by W. N. Suksdorf (No. 1021) in wet places on mountains, Skamania County, Wash., August 28, 1890. (Pl. I, fig. 1.)

DISTRIBUTION: British Columbia and Montana to California and Utah.

BRITISH COLUMBIA: Chilliwack Valley, *Macoun* 26042, 26043; Asulkan Glacier, Selkirk Mountains, *Macoun* 3. WASHINGTON: Mount Adams, *Suksdorf* 24, 194; Nason Creek, *Sandberg and Leiberg* 676. OREGON: Mount Hood, *Hall* 618; Eagle Creek, *Cusick* 1069. MONTANA: Gallatin River, *Twedy* 1019. WYOMING: Teton Forest Reserve, *Twedy* 30. UTAH: Alta, Wasatch Mountains, *Jones* 1275; Salt Lake City, *Jones* 1008. CALIFORNIA: Pine Creek, *Davy*; Lake Chiquita, *Congdon* 16; (without locality) *Bolander* 6102; Lassen County, *Baker and Nutting*; Fresno County, *Hall and Chandler* 604; Blue Canyon, *Greene* in 1895.

Section 2. *Euagrostis*. Rachilla not prolonged.

\*Palet evident, 2-nerved.

†Palet as much as one-half the length of the flowering glume. Species group of *A. alba*.

### 3. *A. stolonifera* L.

*A. stolonifera* L., Sp. Pl. 62. 1753. It is best to consider as the type of this species the specimen in the Linnaean herbarium, although the name has been applied erroneously to a stoloniferous form of *A. alba* L. The Linnaean specimen is marked by Linnaeus *A. stolonifera*, but is what has been called *A. verticillata* Vill. by later authors. For detailed notes upon this and reasons for considering the Linnaean specimen as the type, see Botanical Gazette 38: 139, 1904. In this article I stated that the Linnaean specimen was from "Attica." Mr. Theo. Holm has called my attention to a statement by Hartmann (K. V. Ak. Hand., 1849), who examined this specimen and says that the characters which I interpreted as *Atica* are  $\Delta$  *tica*, the meaning of which he is unable to guess.

*A. verticillata* Vill., Prosp. 16. 1779. "Agrostis panicula subsecunda subspicata, verticillis in penicillum confertioribus. Flores virides, numerosissimi; corolla minim." Mr. C. de Candolle has kindly sent me the transcript of the description. I do not know where the type of this is located.

*A. decumbens* Muhl., in Ell. Sk. Bot. S. C. and Ga., 1: 136. 1816.<sup>a</sup> "Grows around Charleston; rare, perhaps imported. I should have referred it to *A. dispar* Michx., but its size and almost equal valves of the corolla forbade." Mr. E. D. Merrill has examined the type specimen in Elliott's herbarium, and states that it is *A. verticillata* Vill. (U. S. Dept. Agr., Div. Agros., Circ. 29: 10, 1901). *A. decumbens* Muhl., as described in his Catalogue, is probably a form of *A. alba*.

*A. leptos* Steud., Syn. Pl. Glum. 1: 169, 1854. I have not seen this, but it doubtless must be referred to *A. stolonifera* L. "Louisiana" is given as the type locality.

*A. aquatica* Buckley, Proc. Acad. Nat. Sci., Phila., 1862: 90. 1863. There appears to be no type of this in existence. There is none at the Philadelphia Academy of Natural Sciences, and Doctor Gray, in his review of Buckley's plants, states that no specimen of this was communicated to him (l. c., 332). The description applies to *A. stolonifera* L. "On small floating islands in the mill pond or large spring at San Saba, the capital of San Saba County" (Texas).

In addition to the synonyms given above there are several in the literature of European plants, such as *A. stolonifera dulcis* Pers., Syn. 1: 75, 1805; *Vilfa dulcis* Beauv., Agrost. 16, 1812; *A. dulcis* Sibthorp in Pers., l. c., and Kunth Enum. 1: 218, 1833; *A. alba verticillata* Pers., l. c.

<sup>a</sup> Date should be December, 1816, instead of 1817, fide Barnhart in Bul. Torr. Bot. Club, 28: 687, 1901.—P. L. RICKER.

Culms usually decumbent at base, 20–80 cm. high, sometimes with long creeping and rooting stolons. Leaves numerous, light or glaucous green; blades lanceolate, rather short and narrowed from below the middle to the acute apex, usually 3–4 mm. wide and 5–10 cm. long. Panicle contracted, lobed or verticillate, especially at base, 3–10 cm. long, light green or rarely purplish; branches flower-bearing from base. Empty glumes equal, obtuse, or barely acute, scabrous on back and keel, 2 mm. long; flowering glume half as long, awnless, truncate and toothed at apex; palea nearly as long as its glume. (Pl. V, fig. 2.)

DISTRIBUTION: California to Texas, Mexico, and the warmer parts of South America; also in the warmer regions of the Old World, from France to India.

It grows in moist places, especially along irrigating ditches. In the United States this appears like an introduced species either from the Old World or from farther south. We have specimens from Portland, Oreg. (*Leckebuy*, 10), Walla Walla, Wash. (*Leckebuy* 32, probably cultivated), and the species occasionally occurs in the Southeastern States. The following specimens will illustrate the range in the Southwestern States and Mexico where the species is common.

CALIFORNIA: San Bernardino Mountains, *Parish* 3284; Monterey, *Davy* 7516. ARIZONA: Grand Canyon, *Leiberg* 5947; Tucson, *Toumey* 771. NEW MEXICO: *Wright* 1984; Roswell, *Earle* 560; Rio Arriba County, *Heller* 3762. UTAH: Rockville, *Jones* 5224. TEXAS: *Lindheimer* 558; Austin, *Hall* 764. MEXICO: Valley of Mexico, *Pringle* 9596; Guadalajara, *Palmer* 230; Mexico, *Bourgeau* 224; Oaxaca, *Nelson* 1305.

We have specimens also from Guatemala (*J. D. Smith* 2702) and Bolivia (*Rusby* 40), and the species is probably common in Central America and the warmer parts of South America.

#### 4. *A. alba* L.

*A. alba* L., Sp. Pl. 63. 1753. Placed under the section *Mutica*. "Agrostis panicula laxa, calycibus muticis aequalibus. Roy. Lugdb. 59. Habitat in Europe nemoribus." There are five sheets in the Linnean herbarium marked *A. alba*, but I have considered as the type the plant thus labeled in the handwriting of Linnæus. It has a long ligule and a rather large and compact panicle.

*A. dispar* Michx., Fl. Bor. Am. 1: 52. 1803. "In Carolina inferiore." The type is in Michaux's herbarium deposited in the Museum of Natural History at Paris. It is the ordinary form of *A. alba*. This has often been referred to *A. altissima*.

*Vilfa dispar* Beauv., Agrost. 16. 1812. Transfers *A. dispar* Michx.

*A. vulgaris alba* Vasey, Descr. Cat. 47. 1885.

The synonymy given in European literature is very extensive. I have included here only the names by which the species has been commonly known in this country.

Culms erect or with a decumbent or rooting base, 20–150 cm. high, arising from a tufted clump of roots and sending out rootstocks or stolon-like stems, which arise into culms. Leaf blades numerous, in some forms stiff and upright, in others lax and partially twisted, scabrous, and sometimes glaucous, varying in width according to the size and vigor of the plant; ligule varying from long and acute (5 mm.) to short and obtuse. Panicle upright, 5–30 cm. long, with numerous, usually loose and spreading (not diffuse) but sometimes contracted, branches, at least the lower in whorls. Spikelets 2–3 mm. long, pale or purple; empty glumes equal, acute, somewhat scabrous on the upper part of keel, but not conspicuously so; flowering glume a little shorter than the empty glumes, sometimes only  $\frac{2}{3}$  as long, obtuse, rarely awned on the back; palea  $\frac{1}{2}$ – $\frac{2}{3}$  as long as the flowering glume. (Pl. II.)

DISTRIBUTION: Native across the northern part of the continent and southward

in the mountains. Extensively cultivated as a meadow grass under the name of redtop, and a more stoloniferous form as a lawn grass under the name of creeping bent. It has escaped from cultivation and is well established throughout the United States, though rare in the extreme South. The stoloniferous form used for lawns has been generally known as var. *stolonifera*, but it is not *A. stolonifera* L. which is *A. verticillata* Vill.

#### ***A. alba vulgaris* (With.) Thurb.**

*A. vulgaris* With., Bot. Arr. Br. Pl., Ed. III, 132. 1796. This form was first distinguished by Smith (Icones Pl., 54, 1789), but no name was given. Withering calls attention to this and supplies a name. The latter at the end of his description states: "*A. capillaris* Huds. and Bot. Arr., Ed. II. Very common, but chiefly grows on poor dry and sandy land." There is no type of *A. vulgaris* in existence.

*A. alba vulgaris* Thurb., in Gray Man., Ed. VI, 647. 1890. "Nat. from Europe and cultivated, also perhaps indigenous." Reduces *A. vulgaris* to a variety of *A. alba* and gives a description.

*A. alba minor* Vasey, Contrib. U. S. Natl. Herb., 3: 78. 1892. No type is indicated nor is there a specimen in the National Herbarium which is thus marked by Doctor Vasey. There is, however, a specimen which is labeled "*Agrostis vulgaris*, a low form, Washington. Waste ground. Dr. Geo. Vasey." This corresponds exactly to the description and may be considered the type.

This subspecies can be separated only arbitrarily from the species, as there are so many intermediate forms. Characteristic specimens as found in the United States differ from *A. alba* as follows: The culms are upright, rather slender, 20-40 cm. high, and often tufted, the rhizomes at base short or none; leaf blades short, ascending, 5-10 cm. long and 1-2 mm. wide; ligule short, 1-2 mm. long, and obtuse; panicle loose, 5-10 cm. long, the branches few, spreading, giving it a divaricate appearance. (Pl. III, fig. 1.) The descriptions of the European plant state that the panicle remains spreading after flowering, while in *A. alba* the panicle contracts. I have not observed this to be a diagnostic character. The form here described is common in New England and less so farther south, and seems fairly distinct through this region. But in the Western States, especially in the mountain region, the forms intergrade, causing great perplexity.

It is difficult to determine with the data at hand where these forms may be native in this country. The species is widely cultivated and readily escapes. It appears to be native in the northern portion of our range and in the Rocky Mountains, but the forms which give most evidence of being native are those which would be referred to *A. alba vulgaris*. The form found evidently introduced through a large part of the United States is the large plant which I have referred to *A. alba*. This has taller stems, wider leaf blades which may droop, larger, more dense panicles, the branches often spikelet-bearing nearly to the base, ligules larger, and the stolon-like rhizomes often long and stout.

The following specimens represent fairly well the smaller form, *A. alba vulgaris*:

LABRADOR: *Waghorne* 34. NEWFOUNDLAND: *Waghorne* 3, 4, 6, 17, 23, 31, 38. *Robinson and Schrenk*, August 16, 1894. NEW BRUNSWICK: St. Andrews, *Fowler*, July 24, 1900, July 30, 1901. ONTARIO: Ottawa, *Macoun* 12999. MAINE: East Auburn, *Merrill* 20; Van Buren, *Fernald* 179, 179a; Orono, *Fernald* 532. NEW HAMPSHIRE: Mount Washington, *Hitchcock*, July, 1902. VERMONT: Burlington, Herb. Univ. 40. MASSACHUSETTS: Provincetown, *Hitchcock*, July, 1902. CONNECTICUT: Greens Farms, *Pollard* 111. PENNSYLVANIA: Somerset County, *Saunders* 4. DISTRICT OF COLUMBIA: *Hitchcock*, September 20, 1903. MICHIGAN: Keweenaw County, *Farwell* 571. A specimen collected at Sitka, Alaska, by Evans (266) has a palet and is referred to this species.



A teratological form of this is common in New England.<sup>a</sup> The floral parts are abnormally elongated. The most important synonymy of this is as follows:

*A. sylvatica* L., Sp. Pl., Ed. II, 2: 1665. 1763. "Habitat in Angliæ sylvis humosis."

*A. alba sylvatica* Scribn., Mem. Torr. Bot. Club, 5: 40. 1894. Reduces *A. sylvatica* L. to variety.

*A. polymorpha vivipara* Trin., Unifl., 200. 1824. Trinius gives an extended classification of the varieties of *A. polymorpha* Huds. [*A. alba* L.] and includes this form (*A. sylvatica* L.) under "*monstrosa*."

### *A. alba aristata* Gray.

*A. stricta* Willd., Sp. Pl. 1: 366. 1797. (Not of several other authors.) "*A. panicula elongata, stricta, corollis calyce minoribus: arista e basi petali, tortila, flore longiore.*" "Habitat in America boreali." The type of this is in the Willdenow herbarium at the Botanical Garden in Berlin.

*A. stricta* Muhl., Gram. 65. 1817. From the description this appears to be the same as the above. There is no specimen in Muhlenberg's herbarium at the Philadelphia Academy of Natural Sciences.

*A. alba aristata* Gray, Man., Ed. I, 578. 1848. Gives short description and cites *A. stricta* as a synonym.

*A. neoqca* Steud., Syn. Pl. Glum. 1: 17. 1854 "Hrb. Despreaux. Terra nova." From the description this appears to be the awned form of *A. alba*.

Panicle spreading; flowering glume with an exerted dorsal awn from near the base. Culm slender and rather delicate; resembling *A. canina*, from which it differs in having a palet about half as long as the glume.

This is scarcely more than a form of *A. alba vulgaris*, as the awn is often present only on a part of the spikelets of a panicle. However, the awned forms seem always to be comparatively small and delicate. (Pl. III, fig. 2.)

DISTRIBUTION: Northeastern United States.

MAINE: Greenville, *Fernald* 266; Southport, *Fernald* 533; Fort Preble, *Gayle* 786. RHODE ISLAND: Providence, *Olney*. CONNECTICUT: New Haven, *Allen* in 1878. NEW JERSEY: Wildwood, *Pollard*, July 4, 1897. DELAWARE: Faulkland, *Commons*; Centerville, *Commons* 351. WEST VIRGINIA: Wyoming County, *Morris* 1197; Morgantown, *Millspaugh* 244. DISTRICT OF COLUMBIA: *Hitchcock*, September 20, 1903. VIRGINIA: Portsmouth, *Noyes* 4.

*A. aristata* Sincl. is mentioned in Steud. Nom., Ed. II, 1: 39, 1840, as a synonym of *A. alba*, but without description; hence is not technically published, and does not interfere with the use of *A. alba aristata* Gray.

A specimen from meadows, Cedar Hill, Vancouver Island, British Columbia (*Macoun* 40, June 16, 1887), resembles many of the mountain forms of *A. alba*, approaching variety *vulgaris*, but the flowering glume is awned. The culms are taller than usual for variety *aristata* (being about 60 cm. high). This is mentioned in Macoun's Catalogue of Canadian Plants 2: 198, 1888, and 5: 392, 1890, under other names, but both are nomina nuda.

### *A. alba maritima* (Lam.) Meyer.

*A. maritima* Lam., Encycl. 1: 61. 1783. "Cette plante crôit dans les lieux sableux et maritimes des environs de Narbonne, et m'a été communiquée par M. l'abbé Pourret (v. s.)." I have not examined the type of this, but it is probably in the herbarium of the Jardin des Plantes at Paris.

*A. alba maritima* Meyer, Chloris Hanov. 656, 1836, fide Aschers. & Graebn. Synops., 2: 176, 1899.

This plant has been described in European floras under several names. The New England plant was referred to *A. coarctata* Ehrh. (Hoffm. Deutsch. Fl.,

<sup>a</sup>An examination of one of these specimens (White Mountains, Hitchcock, July, 1903) shows that this condition is due to the presence of nematodes (a species of *Tylenchus*) in the aborted ovaries.—ERNST A. BESSEY,

Ed. II, 1: 37, 1800) in Britton & Brown, Ill. Fl. and in Britton, Man. This was reduced to a variety, *A. alba coarctata* Scribn., in Rand & Redfield, Fl. Mt. Des., 177, 1894.

Culms in large tufts, often decumbent and rooting at the base. Leaves short, ascending, and rather thick. Panicle contracted, sometimes almost spikelike. (Pl. IV.)

DISTRIBUTION: Delaware and northward, mostly near the coast in brackish marshes or on sand dunes.

NEWFOUNDLAND: *Waghorne* 1, 2, 6, 14, 17, 22, 54. NOVA SCOTIA: *Canso Fowler*, August 8, 1901. NEW BRUNSWICK: *Bass River, Fowler*, July 16, 1875. MAINE: *Cape Elizabeth, Scribner*, July 26, 1895; *Gayle*, October 17, 1896; *Edgartown, Burgess*, July 17, 1893. MASSACHUSETTS: *Revere, Churchill* in 1898, *Young* in 1892, *Scars* in 1883; *Nantucket, Hitchcock*, July, 1902. CONNECTICUT: *Storrs, Hitchcock*, July, 1902; *Groton, Graves*, 243; *Southington, Bissell* in 1895. PENNSYLVANIA: *Philadelphia, ballast, Heritage* 10. NEW YORK: *Amagansett, L. I., Peck* 2. NEW JERSEY: *Wildwood, Pollard*, July 4, 1897. DELAWARE: *Slaughter Beach*, 95; *Greenbank*, 96; *Faulkland*, July 9, 1879—all by *Commons*.

#### 5. *A. humilis* Vasey.

*A. humilis* Vasey, *Bul. Torr. Bot. Club*, 10: 21. 1883. "Has the appearance of *A. varians*, but that species has no palet. Found by W. N. Suksdorf on Mount Paddo, Washington Territory, and by Mr. Howell on Mount Adams." The type collected by Suksdorf on Mount Paddo (now called Mount Adams) is in the National Herbarium. (Pl. VIII, fig. 1.)

Culms slender, tufted, from a perennial root, erect, 10–40 cm. high. Leaves mostly basal, the blades 2–10 cm. long, 2 mm. or less wide, flat and thin, or in dwarf specimens conduplicate or filiform. Panicles 2–8 cm. long; in the taller specimens rather open and loosely flowered, in dwarf plants narrow and almost spikelike. Spikelets usually purple,  $1\frac{1}{2}$ –2 mm. long; empty glumes equal, rather broad, and abruptly pointed, smooth or slightly scabrous on upper part of keel; flowering glume nearly as long as empty glumes, awnless; palet usually about two-thirds as long as flowering glume, or rarely shorter.

The dwarf forms can scarcely be distinguished from *A. rossae* except by the presence of a palet. The larger forms appear to pass into *A. alba vulgaris*, but the spikelets are somewhat smaller.

DISTRIBUTION: British Columbia to Oregon and Colorado at high altitudes.

BRITISH COLUMBIA: *Selkirk Mountains, Canby* 4; *Chilliwack valley, Macoun* 26033. WASHINGTON: *Mount Rainier, Piper* 1975, 1977; *Allen C*; *Olympic Mountains, Elmer* 1951; *Mount Adams, Suksdorf* 25, 602, *Howell* 85; *Skamania County, Suksdorf* 1079; *Okanogan County, Elmer* 677. OREGON: *Eagle Creek Mountains, Cusick* 1066, 1070. IDAHO: *Bitter Root Forest Reserve, Leiberg* 2948, 2969; *Mill Creek, Henderson* 3927. WYOMING: *Yellowstone Park, Rose* 700, *Tweedey* 603; *Teton Mountains, Tweedey* 24, 26, *Merrill and Wilcox* 335, 344; *Carbon County, Nelson* 4014; *Albany County, Nelson* 1814, 5202; *Dome Lake, Nelson* 2413; *Bighorn County, Nelson* 415, *Williams* 2952. COLORADO: *Buffalo Pass, Shear and Bessy* 1447, 1452, 1460, 1461, 1478, 1479, 1486; *Silver Plume, Rydberg* 2456; *Rocky Mountains, Hall and Harbour* 673; *Denver, Eastwood*; *Marshall Pass, Clements* 213. I have also referred to this species Pringle's No. 4251, collected in the State of Mexico, at an altitude of 12,000 feet.

#### 6. *A. depressa* Vasey.

*A. depressa* Vasey, *Bul. Torr. Bot. Club*, 13: 54. 1886.

The following is the original description: "Culms decumbent and geniculate at the base, becoming erect, 6 to 10 inches high, slender, leafy below; leaves



short and narrow, plain, 1 to 2 inches long, one-half line wide, acute; ligule conspicuous, about one line long, obtuse and ciliate at apex; sheaths smooth, striate, the lower ones loose; panicle narrow, 1 to 2 inches long, or in age broader and more spreading; the branches short, variable in number, 2 to 5 at the lower joints and unequal; pedicels scabrous, about as long as the spikelets, empty glumes nearly equal, about 1 line long, ovate-lanceolate, acute, roughish on the keel above; flowering glume one-third shorter, narrowly oblong, obtuse or minutely dentate at the apex; palet narrow, half as long as its glume. Collected in Clear Creek Canyon, Colo., by H. N. Patterson, 1885." (Pl. V, fig. 1.)

This rests upon a single collection, the type specimen being in the National Herbarium. What I take to be the same species occurs on the Pacific coast and was named *A. exarata stolonifera* Vasey, Bul. Torr. Bot. Club, 13: 54, 1886 (following *A. depressa*). "Bottom lands of the Columbia River, collected by Mr. W. N. Suksdorf." The type of this is also deposited in the National Herbarium. The original description is appended: "*Agrostis exarata* var. *stolonifera* V. Cespitose; culms 8 to 12 inches high from a decumbent base, with numerous short leaves, which are seldom more than an inch long, narrow, acuminate; the radical leaves also short and abundant; ligule membranaceous, conspicuous, obtuse; panicle 1½ to 2 inches long, purplish, narrow; branches very short and clustered, mostly flowering to the base, some of the lowest longer and naked below; spikelets about 1 line long, sometimes two-flowered; empty glumes nearly equal, acute, hispid on the keel; flowering glumes one-third shorter, oblong-ovate, toothed at the apex, sometimes with a short awn, palet small, equaling the ovary; long, leafy stolons, sometimes a foot long, are often emitted from the base, the joints 1 to 2 inches apart. Bottom lands of the Columbia River, collected by Mr. W. N. Suksdorf. Perhaps a good species."

This species is characterized by its tufted geniculate culms; short, narrow upright culm leaves, which are very scabrous on both surfaces; the conspicuous ligule 2-3 mm. long; and the narrow spikelike panicles. The flowering glume bears a minute prickle on the back below the tip which represents the excurrent keel. (Pl. VI.)

DISTRIBUTION: Colorado, Washington to California.

WASHINGTON: Klickitat County, *Suksdorf* 40, 140. OREGON: Astoria, *Leckebny*; Gearhart, *Hitchcock*; Fort Stevens, *Hitchcock*. CALIFORNIA: Mendocino County, *Davy and Blasdale* 6124. COLORADO: *Patterson* 46.

Suksdorf's plants have numerous 2-flowered spikelets seemingly staminate, each with palet ¼-½ the length of the flowering glume, and his 140 has some of the spikelets awned.

*A. depressa* is connected with *A. alba* through *A. alba maritima*.

I have observed *A. depressa* growing on the sand dunes near the coast at Gearhart and Fort Stevens, Oreg. The tufts send out stoloniferous stems which creep over the sand for several feet. The sheaths on these runners are somewhat inflated and the blades are only 1-2 cm. long. The runners often end in an ascending flower culm. When the plant grows in sand, rhizomes are formed. The type specimens do not show these stolons, but in other particulars they are similar. This species is quite common along the coast of Oregon, but apparently is quite rare in the interior, as shown by the single collection from Colorado.

It is unfortunate that a species well known in one locality should have as its type a specimen from a widely separated locality and a specimen also which does not show the characteristic habit of the more western form. It is to be hoped that intermediate collections of the species may be made which will throw light upon this question of range.

7. *A. rosei* Scribn. & Merrill.

*A. rosei* Scribn. & Merrill, U. S. Dept. Agr., Div. Agros., Bul. 24: 21. 1901. The following is a copy of the original description:

"A slender, erect perennial, 4 to 5 dm. high, with short, flat leaves and very open, capillary panicles, 1 to 1.5 dm. long. Culms glabrous, somewhat geniculate at the lower nodes; sheaths shorter than the internodes, smooth, striate; ligule hyaline, obtuse, 2 mm. long; leaf blades linear, acuminate, 5 to 8 cm. long, 2 to 3 mm. wide, scabrous on both sides and on the margins. Panicle



FIG. 1.—*Agrostis rosei* Scribn. & Merrill; a, a spikelet; b, the awned flowering glume and palea; c, the grain.

very open, pale or purplish, the branches capillary, the lower ones verticillate, the upper ones opposite, spreading, dichotomously or verticillately branching, somewhat scabrous, the lower ones 5 to 6 cm. long; pedicels elongated, flexuous. Spikelets about 2 mm. long; empty glumes ovate-lanceolate, acute, subequal, thin, slightly scabrous on the keel above; flowering glume slightly shorter than the empty glumes, obtuse, often with 2 or 3 blunt teeth at the apex; awn attached near the base, equaling or slightly exceeding the glume, finely scabrous, straight or slightly bent near the middle. Palea very thin, hyaline, lanceolate, obtuse, nearly three-fourths as long as the flowering glume. Grain lanceolate, about 1.5 mm. long."

Type specimen collected on Sierra Madre Mountains, State of Zacatecas, Mexico, J. N. Rose 2373, August 18, 1897.

In addition to the type we have one specimen: NEW MEXICO: Cloverdale, *Mearns* 462, July 15, 1892.

††Palet about one-fourth the length of the flowering glume. Panicle contracted.

8. *A. glomerata* (Presl) Kunth.

*Vilfa glomerata* Presl, Rel. Haenk 1: 239. 1830. "Hab. in montanis Peruviae huancocensibus." The type specimen is in the Presl herbarium at Prague. It is a single plant

with a narrow panicle, somewhat interrupted below, short palet and awnless flowering glume. Presl describes the palet as being as long as the flowering glume ("Paleæ æquilongæ") and places it in the genus *Vilfa*, but the type specimen has the palet only about one-fifth as long as the flowering glume.

*A. glomerata* Kunth, Enum. 1: 219. 1833. "Peruvia." Transfers *Vilfa glomerata* Presl, and gives description.

*Agrostis californica* Trin., Mem. Acad. St. Petersburg., Ser. VI. 6<sup>2</sup>: 359. 1841. (*Agrostidea* II: 113.) Trinius cites *Vilfa glomerata* Presl as a synonym, but gives as the locality "California. In montanis Peruviae huancocensibus." The type specimen is in the herbarium of the St. Petersburg Academy of Sciences,

A few spikelets from the type are deposited in the National Herbarium. Trinius describes the flowering glume and palet as being equal ("Valvulae æquales, glabræ"), but in the type specimen the palet is one-fourth the flowering glume. The type specimen has scabrous, somewhat inflated sheaths, panicle 4 inches long, dense and interrupted, and no awn to the flowering glume.

*A. densiflora* Vasey, Contr. U. S. Natl. Herb. 3: 72. 1892. "Santa Cruz, Cal. (Dr. C. L. Anderson)." The type specimen is in the National Herbarium. (Pl. VII. fig. 2.)

*A. densiflora arenaria* Vasey, Contr. U. S. Natl. Herb. 3: 72. 1892. "Seashore Mendocino County (C. G. Pringle, in 1882)." The type specimen is in the National Herbarium. It is more decumbent and spreading at base and the panicles are somewhat narrower but other specimens connect this with *A. densiflora* Vasey.

*A. arenaria* Scribn. is mentioned as a synonym under *A. densiflora arenaria* Vasey (l. c.), and consequently has the same type.

*A. inflata* Scribn., in Beal, Grasses 2: 325. 1896. "British Columbia (Vancouver Island), Macoun 258 in 1893." Type specimen in the herbarium of Prof. W. J. Beal, Agricultural College, Michigan (No. 258).

Macoun's No. 259 is in the National Herbarium and is probably the plant to which Scribner gave the name. Mr. Macoun writes that No. 258 was collected June 9, 1893, and No. 259 about August 7 of the same year. They were not collected at quite the same locality, but he considers them evidently the same species and growing under the same conditions. It is to be noted that No. 258 has the empty glumes awned, while in No. 259 they are only slender-acuminate. (Pl. VII. fig. 1.)

This differs from *A. densiflora* Vasey in being dwarf (less than 10 cm. high) and in having the flowering glume provided with a bent, exerted awn.

Culms erect or ascending, usually 20-30 cm. high, stout, more or less scabrous below the panicle. Leaves with conspicuously striate, often inflated, sheaths, rather thick, striate, scabrous, blades abruptly pointed or boat-shaped at apex, 2-8 mm. wide, 3-7 cm. long. Panicles close and spike-like, 2-7 cm. long, 5-15 mm. thick, in the larger forms more or less lobed. Spikelets about 3 mm. long; empty glumes equal, scabrous on keel and somewhat on back, sharp-pointed, but usually not awned; flowering glume 2 mm. long, awnless or with a straight or bent awn from the middle of the back; callus hairs short; palet about .5 mm. long, 2-nerved.

DISTRIBUTION: British Columbia to Peru, along the seacoast. VANCOUVER ISLAND: *Macoun* 259. OREGON: Cape Foulweather, *Lake* in 1890. CALIFORNIA: Mendocino County, *Davy and Blasdale* 6025, 6167, 6135, *Pringle* in 1882, *Congdon* in 1902; Point Reyes, *Davy* 6755, 6792, 6793; Santa Cruz, *Anderson*; (without locality) *Kellogg and Hartford*, *Bigelow* in 1853-54; *Bolander* 6466 in part.

This is evidently the *A. mucronata* of Thurber in Botany of California 2: 272. 1880. The description applies, and there is a specimen in Mr. Nash's herbarium "Mendocino Co., California, Seacoast, Bolander 6466." (See note on *A. nana* under *A. breviculmis*.) This specimen is small and resembles the type of *A. inflata* Scribn.

The root of *A. glomerata* is described by Vasey, Beal, and others as annual and by Trinius as perennial. I am unable to determine certainly from the specimens whether or not the species is perennial. There is no indication of more than one year's growth, but the base of the stem seems too robust for an annual. The awn is variable. Although the type is awnless most of our specimens have awns of varying length and in the same specimen the awn may be present or absent.

*A. mucronata* Presl has been cited by some authors as a synonym of this. I examined this plant at Prague and do not think it occurs in the United States. It differs from *A. glomerata* in having the finer leaves mostly basal, the panicle contracted but loose and fine in appearance, and the empty glumes awn-pointed.



\*\* *Palet wanting or a small nerveless scale.*

† *Flowering glume provided with a very slender awn about 5 mm. long.*  
*Delicate annuals.*

### 9. *A. exigua* Thurb.

*A. exigua* Thurb., in Brewer and Watson, Bot. Calif. 2: 275. 1880.

"Annual; culm (including panicle) 1 to 4 inches high, erect, flattened, very slightly scabrous toward the nodes, sometimes branching from near the base; leaves from an inch to 2 lines long or less, those upon the branches sometimes with the blade reduced to a mere point, mostly convolute, roughened on both sides and margins, especially near the apex; ligule about a line long, acute; sheaths very loose, strongly striate and minutely scabrous; panicle half the length of the plant, included and at first narrow, at length open; lower rays about 5, the others in pairs, the longer about an inch in length, bearing 1-5 flowers above the middle, scabrous; spikelets three-fourths of a line long, the pedicels much enlarged just below; glumes not pointed, the lower slightly longer, aculeolate on the keel and with minute scattered hairs all over, especially at the apex, generally tinged with purple; floret of but 1 palet, equaling the glumes, the callus very minute, with a few hairs; palet 5-nerved, scabrous with few minute hairs, very acute at apex, the midnerve prolonged into a roughish awn 4 lines longer than itself, inserted about one-fifth below the tip of the palet, which is split down to that point forming 2 setae; upper palet not manifest or a mere scale; stamens (1)?"

"Foothills of the Sierras, Bolander. The specimens accompanied a much reduced form of *A. exarata*, from which it is abundantly distinct, as it also is from *A. canina*." (Pl. VIII, fig. 2.)

At the Gray herbarium I have examined Bolander's specimen, a portion of which is deposited in the National Herbarium, and am unable to identify it with any other species of the United States. It is unusual to have a species so rare as is indicated by a single collection in a region so well known as California, and I suspect that the species is either introduced or occurs farther to the south in Mexico or Central America, the species of which region are not sufficiently well known.

Mr. Thurber at first referred this to *A. eliottiana*, which it resembles in habit. But it differs from that species in having the flowering glumes as long as the empty glumes, the lobes extending into two awned teeth, and in the stouter straight awn. The empty glumes are only slightly acute, 1.5 mm. long, equal, slightly scabrous on back. Awn scabrous, straight, 5-6 mm. long.

### 10. *A. eliottiana* Schult.

*A. arachnoides* Ell., Sk. 1: 134. 1816. "From specimens collected near Orangeburg, by Mr. I. S. Bennett." Not *A. arachnoides* Poir., Suppl. 1: 249, 1810. The type of *A. arachnoides* Ell. is in Elliott's herbarium, and has been examined by Mr. E. D. Merrill (U. S. Dept. Agr., Div. Agros., Circ. 29: 10, 1901).

*A. eliottiana* Schult., Mant. 2: 372. 1824. Name changed from the preceding.

Annual. Culms slender and delicate, 10-40 cm. high. Blades small, slender, and soft. Panicle diffuse, branches slender and spreading, scabrous, spikelet-bearing toward the extremity. Empty glumes equal, acute, scabrous on keel, 1.5 mm. long; flowering glume about 1 mm. long, very thin and delicate, short-hairy at base, with a very delicate sinuous awn about 5 mm. long, attached on the back below the apex (sometimes unawned); palet none. (Pl. IX, fig. 1.)

DISTRIBUTION: South Carolina to Missouri and Texas.

SOUTH CAROLINA: Orangeburg, Hitchcock. GEORGIA: Stone Mountain, Small 765, Curtiss 6771; Rome, Chapman. ALABAMA: Tuskegee, Carver 56; Mobile, Mohr. TENNESSEE: Kingston Springs, Gattinger 3391 (Curtiss N. A. Plants).

ILLINOIS: Johnson County, *Evelyn Ridgway*. MISSOURI: Chadwick, *Bush* 48; Eagle Rock, *Bush* 258; Jefferson County, *Eggert* 161. ARKANSAS: Benton County, *Plank* 90. MISSISSIPPI: Biloxi, *Tracy* 4554. LOUISIANA: (without locality) *Bush* 33; *Carpenter*. TEXAS: Houston, *Hall* 762, 763; Gillespie County, *Jermy* 6220; Galveston, *Plank* 94; Columbia, *Bush* 120; Dallas, *Reverehon* 1039; Gregory, *Heller* 1565.

†† Flowering glume awnless or provided with a short awn. Perennials.

‡ Plants spreading by rhizomes.

= Flowering glume provided at base with a tuft of hairs, 1–2 mm. long.

#### 11. *A. hallii* Vasey.

*A. hallii* Vasey, Contr. U. S. Natl. Herb. **3**: 74. 1892. The original description is as follows: "Culms erect, stout, 2 to 3 feet high, smooth, not stoloniferous; lower leaves narrow, inclined to be involute, the upper ones flat, 3 to 6 inches long, 1 to 2 lines wide, scabrous; ligules 2 to 3 lines long, acute; panicle 6 to 9 inches long, the rays erect, spreading, the lower in clusters of 5 to many, unequal, the longer ones 2 to 3 inches, branching above the middle; spikelets  $1\frac{1}{2}$  lines long, somewhat appressed and crowded; empty glumes acute,  $1\frac{1}{2}$  to 2 lines long, scabrous on the keel; the floral glume nearly as long, with 2 tufts of hairs at the base; palet wanting. Oregon, Washington, and California."

The type specimen was collected in Oregon by E. Hall in 1871 and is marked "A. Hallii" in Doctor Vasey's handwriting. It is deposited in the National Herbarium. (Pl. X, fig. 2.)

The description quoted above is evidently based upon several specimens and probably includes more than one species. The description states that the plants are not stoloniferous, but the type specimen does not show the base of the plant. The composite nature of the description is also indicated by the latitude given in the measurements and in the range.

*A. davyi* Scribn., U. S. Dept. Agr., Div. Agros., Circ. **30**: 3. 1901. "In brush on hillsides near Point Arena, Mendocino County, Cal. No. 6062 Davy and Blasdale." The type specimen is deposited in the National Herbarium. Mr. Davy has added a note that this was collected near mouth of Albion River. (Pl. XI.)

*A. occidentalis* Scribn. & Merrill, Bul. Torr. Bot. Club, **29**: 466. 1902. "Type specimen collected by C. L. Shear, No. 1644, in a moist glade, McMinnsville, Yamhill County, Oreg., July 20, 1899." Type specimen deposited in the National Herbarium. (Pl. XI A.)

The ligules in the type specimen of *A. hallii* are in a rather unsatisfactory condition and are only three in number, but are proportionately shorter than in most of the specimens referred to here. In this respect Henderson 7 and Hall 619, both from Oregon, agree with the type.

Culms about 1 m. high, leafy. Blades 3–5 mm. wide, 10–15 cm. long; ligule usually conspicuous, often nearly 1 cm. long. Panicles 10–12 cm. long, narrow or somewhat spreading. Spikelets pale, the lower glume acuminate, about 4 mm. long, the upper a little shorter; flowering glume 3 mm. long, with a tuft of hairs at base about 1.5 mm. long; no awn or palet.

DISTRIBUTION: Oregon and California, from Santa Cruz northward.

OREGON: Yamhill County, *Howell* 67; Yoquina Bay, *Lake* 8; (without locality) *Hall* 619; *Henderson* 7. CALIFORNIA: Del Norte County, *Davy and Blasdale* 5918; Humboldt County, *Davy and Blasdale* 5493, 5723, 5873, 6175; Mendocino County, *Davy and Blasdale* 6051, 6054, 6062, 6122; *Heller* 5848; Sonoma County, *Bioletti* 110; Mount Tamalpais, *Congdon*; Alameda County, *Davy* 4252, *Blankinship* 4, *Michener and Bioletti* 128; Santa Cruz, *Anderson* in 1886.

#### *A. hallii pringlei* (Scribn.) comb. nov.

*A. pringlei* Scribn., U. S. Dept. Agr., Div. Agros., Bul. **7**: 156. 1897. "Plains, Mendocino County, Cal. (Pringle), and northward to Oregon (?)." Type specimen deposited in the National Herbarium. (Pl. XII.)

Differs from *A. hallii* in narrower and more compact panicles, narrower and more involute leaves, and the whole foliage more stramineous in appearance.

CALIFORNIA: Mendocino County, *Pringle* in 1882, *Congdon* in 1901, *Davy and Blasdale* 6030, 6075.

The type specimen was first named in the herbarium *A. repens* Scribn., and this name is mentioned as a synonym under *A. scouleri* Vasey (Contr. U. S. Natl. Herb., 3: 73. 1892).

== Tufts of hairs at base of flowering glume minute or wanting.

## 12. *A. pallens* Trin.

*A. pallens* Trin., Mem. Acad. St. Petersburg, Ser. VI, 6<sup>2</sup>: 328. 1841. (Agrostidea II: 82.) "Amer-borealis? (Hooker)." The type specimen is in the herbarium of the St. Petersburg Academy of Sciences. It is marked "T. 243," as are other specimens received from Hooker. In the National Herbarium are a few spikelets from the type specimen and also a photograph of the plant, which is a single erect culm with a few narrow root leaves, one culm leaf and a contracted panicle.

*A. exarata littoralis* Vasey, Bul. Torr. Bot. Club, 13: 55. 1886. "Found by Mr. T. J. Howell on the sandy seashore in Oregon." Type specimen in the National Herbarium, labeled "No. 64, Seashore, Tillamook Bay, Oregon. T. J. Howell, July 14, 1882."

Culms rather stiffly upright from creeping rhizomes, 20-40 cm. high, glabrous. Blades erect, 1-3 mm. wide, 5-10 cm. long. Panicles contracted, almost spike-like, 5-10 cm. long, 5-10 mm. wide. Spikelets 2.5-3 mm. long, empty glumes equal, slightly scabrous on keel, but smooth on back; flowering glumes a little shorter, awnless; palea minute. (Pl. XIII, fig. 1.)

DISTRIBUTION: Washington to California, near the seashore.

WASHINGTON: Westport, *Henderson* 2116. OREGON: Tillamook Bay, *Howell* 64; Seaside County, *Shear and Scribner* 1701, 1723, *Hitchcock* in 1901. CALIFORNIA: (without locality) *Bolander* 18, 5064, *Lemmon* in 1875; Del Norte County, *Davy and Blasdale* in 1899; Point Reyes, *Davy* 6682, 6839.

## *A. pallens foliosa* (Vasey) comb. nov.

*A. foliosa* Vasey, Bul. Torr. Bot. Club, 13: 55. April, 1886. "Culms 1½ feet high, erect, smooth; culm leaves 4 or 5, erect, somewhat rigid, 4 to 6 inches long, 1½ to 2 lines wide, long pointed; ligule about 2 lines long, lacerate at apex; panicle 4 to 5 inches long, open and loose, the lower branches mostly in fives, unequal, the lower 1 inch long or more, somewhat spreading, capillary, rather few-flowered, mostly naked below; spikelets little more than 1 line long, lanceolate, abruptly acute; flowering glume nearly as long as the outer ones, 5-nerved, obtuse and shortly 4 or 5 toothed at apex; palea wanting. Collected in Oregon by T. J. Howell. The panicle much like a short branched *A. alba*."

This name appeared first as a nomen nudum (Bul. Torr. Bot. Club, 10: 63, 1883) in Professor Scribner's "List of Grasses from Washington Territory," thus, "*Agrostis foliosa* Vasey ined. equals Nos. 1 and 47 of Howell's Oregon coll."

Doctor Vasey published a second description in the Botanical Gazette for December, 1886, page 337. "Collected in Oregon by Thomas Howell and by Dr. H. N. Bolander."

I have taken, as the type of this, one of the specimens collected in Oregon by T. J. Howell in 1881, labeled *A. foliosa* in Doctor Vasey's handwriting and designated as "No. 1." This specimen is unawned. (Pl. XIV, fig. 1.)

There is an *A. foliosa* Hortul. in Kunth., Enum., 1: 207, 1833, but it has no standing, as it is mentioned only as a synonym under *Cinna filiformis*.

The Washington and Oregon specimens have mostly a rather loose panicle. Southward into California the panicle tends to be narrower and the branches more appressed.



*A. diegoensis* Vasey, Bul. Torr. Bot. Club, **13**: 55. 1886. "Culms erect, stout, 2 to 3 feet or more high, smooth, leaves 4 to 7 inches long, 1 to 2 lines wide, erect, those of the culm with long sheaths (the upper ones 8 or 9 inches long); ligule about 2 lines long, acute; panicle 6 to 8 inches long, lanceolate, the joints rather distant (the lower  $1\frac{1}{2}$  to 2 inches); branches numerous, unequal, erect, the longer ones about 2 inches long, and floriferous above the middle, the shorter floriferous to the base, the flowers numerous; spikelets light green,  $1\frac{1}{2}$  to 2 lines long, outer glumes acute, scabrous on the keel; flowering glume one-third shorter, oblong, obtuse, the midnerve terminating about the middle, with or without a minute awn; palea none. Collected at San Diego, Cal., by C. R. Orcutt. The panicle resembles that of *A. alba*, but is narrower, stouter, and more closely flowered."

There are several specimens in the National Herbarium, collected in the vicinity of San Diego by Mr. C. R. Orcutt. I have considered the type to be among those collected at the earliest date (1884), and marked *A. diegoensis* in Doctor Vasey's handwriting. Of these I have arbitrarily selected one sheet as the type specimen. This is marked "B," and is from Smith's Mountain. This was selected because it is a more perfect specimen. (Pl. XVII.) It happens that this plant has the awn better developed than many of the others, but I am unable to connect the presence of the awn with other characters. Only two or three of these specimens show rootstocks, but the others appear to have been broken off at the surface of the soil.

*A. multicubis* Vasey "in numerous distributions," given as a synonym under *A. diegoensis* in Beal's Grasses, N. A., **2**: 328. 1896.

Culms erect or nearly so, usually rather firm or stiff, or in the slender forms wiry, more or less tufted, but provided with creeping rootstocks, 50-120 cm. tall. Blades varying from very narrow to 3 mm. wide, usually stiff and appressed, but sometimes more lax, the lower ones often pale, straw-colored or brown at time of flowering; ligule short and rounded or acutish. Panicle pale green or rarely purplish, usually narrow, with appressed or at least stiff branches, 10-30 cm. long, some of the branches bare on lower portion, other shorter ones spikelet-bearing from base; in some forms the panicle is more open and spreading. Empty glumes nearly equal, more or less scabrous on keel and sometimes minutely so on back, 2-3 mm. long; flowering glume nearly as long as outer glumes, or only three-fourths as long, hairs at base minute; awn absent or short and straight or rarely bent; palea none. (Pl. XV, and Pl. XVI, fig. 1.)

DISTRIBUTION: British Columbia to California.

In the following specimens the awn is evident though not always exerted:

WASHINGTON: Stony places, Cape Horn, Skamania County, *Suksdorf* 2332. OREGON: Near the glacier on Mount Hood, *Henderson* 7; Mount Hood, *Howell* 42; Cascades of the Columbia, *Howell* 197; in springy places along the Applegate, *Howell* 221 in 1887; Portland, *Bolander* in 1886; (without locality), *Cusick* 1153, *Howell* 1, 4, 10, 48, 84. CALIFORNIA: *Lenmon* in 1882.

In the following specimens the awn is wanting or is only a short dorsal prickle:

BRITISH COLUMBIA: Vancouver Island, *Macoun* 30136. WASHINGTON: Cascade Mountains, *Vasey* in 1889; Mason County, *Piper* 949, 950; Falcon Valley, *Suksdorf* 131, 200, 908; Skamania County, *Suksdorf* 2331, 2658; Klickitat County, *Suksdorf* 199; Whitman County, *Vasey* in 1892, *Vasey* (jr.) 3054, 3057, *Piper* 1929, 3043, *Elmer* 1026. IDAHO: *Henderson* 3061; Moscow, *Henderson* 4641. OREGON: *Henderson* 10; Portland, *Howell* 51; Roseburg, *Howell* 219; Multnomah Falls, *Bolander* in 1866; Soda Springs, *Jones* 306. CALIFORNIA: Mount Shasta, *Palmer* 2660; Eagle Lake, *Davy* in 1894; Humboldt County, *Davy* and *Blasdale* 6216; Placer County, *Carpenter* in 1892; Marin County, *Davy* 6832, 6837; San Francisco, *Bolander*; Amador County, *Hansen* 611, 620, 1738, 1741, 1818, 1987; Monterey County, *Davy* 7701, 7702; Santa Cruz, *Ander-son*; Santa Catalina Island, *Brandege* 50; Santa Rosa Island, *Brandege* 66;

San Diego, *Cleveland* 5, 73; *Orcutt*, several specimens collected in 1884 and two in 1890.

This variety intergrades with the species, differing chiefly in habit, the culms being taller, the foliage more lax, and the panicle more open. The form which happened to be described first, and hence is taken as the species, is confined to the sandy seacoast, and, like other seacoast forms, has a more compact panicle, more conspicuous rhizomes, and stiffer foliage. The type specimen of *A. foliosa* is unawned, but other specimens which resemble it in other respects have the flowering glume provided with a dorsal awn varying from a mere prickle to an exerted awn.

A few of the *Orcutt* specimens from San Diego have larger spikelets, varying from 3.5–4.5 mm. in length, and the culms are tall and stout, but I am unable to distinguish them otherwise.

‡‡ *Plants tufted, but not producing rhizomes.*

= *Panicle narrow, usually a part of the lower branches spikelet-bearing from the base.*

*a. Panicle strict; branches very short and appressed. A low cespitose plant.*

### 13. *A. breviculmis* nom. nov.

*Trichodium nanum* Presl, *Rel. Haenk.* 1: 243. 1830. "Hab. in Peruvia?" Presl's type specimen of *Trichodium nanum* is at Prague. It is the same as figured by Scribner, *Ann. Rep. Mo. Bot. Gard.* 10: 54, 58, pl. 34, fig. 2, 3. 1899. A discussion of the identity of our plant with Presl's is given in *U. S. Dept. Agr., Div. Agros., Circ.* 30: 2, 1901.

*A. nana* Kunth, *Enum.* 1: 226. 1833. "Peruvia?" Transfers *Trichodium nanum* and gives a description.

According to the strict application of the rules of priority, a new name must be given to this plant on account of *A. nana* Delarbre, *Fl. Anverg.*, Ed. 2, 1800. This is a form of *A. alba* and seems not to have been taken up by later authors.

Culms short, 10–15 cm. high, densely cespitose. Blades narrow and rigid, conduplicate or filiform, scabrous on margins, 2–4 cm. long, scarcely more than 1 mm. wide. Panicles strict and narrow, 2–3 cm. long, branches closely appressed, scabrous, not more than 1 cm. long. Spikelets 2½–3 mm. long, the first glume a little longer than the second, both acute and scabrous on the back, especially on the keels, pale and of firm texture; flowering glume about 1.8 mm. or a little less, awnless or with a very short awn just above the middle; palea minute, about .3 mm. long, nerveless. (Pl. XVIII.)

DISTRIBUTION: California to Peru.

CALIFORNIA: Near Fort Bragg, Mendocino County, *Bolander* 6466 in part, on cliffs, *Davy and Blasdale* 6159. NEW GRENADA: *Spruce* 5936. PERU: *Wilkes Exped.*

*A. nana* Kunth is described by Scribner and Merrill as having a perennial root, and in *Davy and Blasdale's* specimens this appears to be so, although this is not certain.

In the Gray herbarium is a specimen from the seacoast, Fort Bragg (Mendocino County), Cal., *Bolander*, No. 6466. This does not agree with *Thurber's* description of *A. mucronata* Presl in *Botany of California*, and hence there has been great confusion. (See note under *A. glomerata*.) *Thurber's* description applies to *A. glomerata* Kunth (*A. californica* Trin., *A. densiflora* Vasey), and in the herbarium of Mr. George V. Nash is a specimen of this from Mendocino County, Cal., ticketed "*Bolander, 6466.*" Thus there were two species collected by *Bolander* under the same number, *A. glomerata* Kunth and *A. nana* Presl, and the latter was sent to the Gray herbarium. In the note in *Botany of*



California Mr. Bolander mentions collecting "at the same time what is apparently a much weatherworn awnless form of it, but it is too imperfect for determination." This is *A. nana* Kunth, the slender form in Mr. Nash's herbarium.

Mr. Nash has sent to the National Herbarium culms from his specimens of Bolander 6466, representing both species. The slender form has a small palet scarcely  $\frac{1}{2}$  mm. long and is identical with Davy and Blasdale, 6159. This is *A. nana*. It has the short truncate flowering glume, with denticulate apex. It is the same as the specimen in the Gray herbarium.

The stouter form looks much like the above, but has an awn below the apex of the longer and acute flowering glume, and the palet is about one-fourth the length of the flowering glume. Awn short, barely exerted. This is *A. glomerata*, though it is much smaller and the panicle narrower than most of our specimens, thus closely resembling *A. inflata* Scribn.

*aa. Panicle narrow but not strict; some of the lower branches 2 cm. or more long.*  
*Group of A. exarata.*

*b. Flowering glume with an exerted awn.*

#### 14. *A. microphylla* Steud.

*A. microphylla* Steud., Syn. Pl. Glum. 1: 164. 1854. "Agraulus brevifolius Nees Mpt. Douglas legit in Am. Sprtr." I have not seen the type of this, but I think there is little doubt that it is the form with short spikelike inflorescence.

*Polypogon alopecuroides* Buckley, Proc. Acad. Nat. Sci., Phila. 1862: 88. 1863. "Columbia Plains, Oregon, Nuttall." Gray states in his criticism of Buckley's species (l. c., 332) that this was distributed as *Deyeuxia alopecuroides* by Nuttall, and consequently, if it is distinct from *A. exarata*, to which he refers it, the name should be *Agrostis alopecuroides*. Gray thus mentions two synonyms. Nuttall's plant is in the herbarium of the Philadelphia Academy of Natural Sciences.

*A. virescens microphylla* Scribn., U. S. Dept. Agr., Div. Agros., Circ. 30: 2 1901. Reduces *A. microphylla* Steud. to a variety.

*A. microphylla major* Vasey, Contr. Natl. Herb. 3: 72. 1892. Vasey quotes as synonym "(*Agrostis exarata* var. *microphylla* Watson)." The description includes several forms and no specimens or definite localities are cited, only "with the same range as the typical form." As Vasey cites an unpublished name of Watson, I have assumed that Watson's plant is the type of this variety. (Pl. XIX, fig. 1.) Watson describes his plant (Bot. King's Exp. 377, 1871) as a variety of *A. exarata*, "Var. (*A. microphylla*, Steud. Syn. Gram. 164. Torrey, Pac. R. R. Surv. 4: 154)," and cites as localities, "On the Truckee River and in the West Humboldt Mountains, Nevada." No. "(1284)." The first cited specimen which is from Truckee valley, Nevada, collected at 4,000 feet altitude, in July, 1867, is taken as the type. Specimens from both localities were distributed under No. 1284. I find no specimens marked in Vasey's handwriting *A. microphylla major*. The specimen is more robust than the type of *A. microphylla*, but there are all gradations connecting the two.

Culms tall and often stout, 50-100 cm. or more or sometimes reduced. Blades flat and scabrous, elongated, in the larger forms as much as 7 mm., but usually 2-3 mm., wide. Panicle narrow, close, and spikelike or rather loose, 10-30 cm. long, branches scabrous, flower-bearing nearly to base. Empty glumes nearly equal, 2.5-3 mm. long, scabrous on keel and usually also on back, acuminate or setaceously pointed; flowering glume about one-third shorter, awned; awn attached about the middle of the back, exerted and bent; palet none. (Pl. XIX, fig. 2.)

DISTRIBUTION: British Columbia to California.

WASHINGTON: *Heller* 4010. OREGON: *Howell, Hall* 614, *Shear* 1645, 1648. CALIFORNIA: *Bolander* 4648, *Orcutt* 1176, *Davy and Blasdale* 5142, *Davy* 6662. LOWER CALIFORNIA: *Orcutt*. VANCOUVER ISLAND: *Dawson* 56; *Macoun* 31. WASHINGTON: *Falcon Valley, Pringle* in 1881; *Suksdorf* 1, 47; *Douglas County*,

*Sandberg and Leiberg* 327; Seattle, *Piper* 828; Chehalis County, *Heller* 4010. OREGON: *Hall* 614; Yamhill County, *Shear* 1645, 1648, 1650; Grants Pass, *Howell* in 1884; Roseburg, *Howell* 223; Washington County, *Howell* 55; White Horse Ranch, *Griffiths and Morris* 469. NEVADA: Truckee valley, *Watson* 1284, September 1867. CALIFORNIA: *Bolander* 4648, 6078; Mendocino County, *Pringle* in 1882, *Davy* 6573, *Davy and Blasdale* 5142; San Francisco, *Bolander* 19; Point Reyes, *Davy* 6777; Monterey County, *Davy* 7725; Santa Cruz, *Anderson* in 1886; Middle Tule River, *Purpus* 5638; San Diego, *Orcutt* 518, 1173, 1176; Contra Costa County, *Davy* 6662.

The type of this species represents a dwarf form. Of the specimens cited the following are similar to Steudel's plant, the others being like the *Watson* plant or intermediate:

OREGON: Grants Pass, *Howell* in 1884; CALIFORNIA: *Orcutt* 1176; Mendocino County, *Davy and Blasdale* 5142, *Davy* 6573; (without locality) *Bolander* 4648.

### 15. *A. ampla* sp. nov.

Culm erect from a slightly decumbent base, stout, 75 cm. high. Blades 5-8 mm. broad, about 15 cm. long, scabrous; ligule 5-6 mm. long, rounded. Panicle large and spreading, 20-25 cm. long; branches numerous, verticillate, many shorter ones spikelet-bearing from base, the longer 5-7 cm. long. Spikelets pale or purplish; lower empty glume 4 mm., upper 3.2 mm. long, acuminate, but not awn-pointed, hispidulous on keel and slightly and very minutely papillate on back, but not scabrous; flowering glume 2.3-2.5 mm. long, awned; awn inserted about the middle of the back, bent at the middle or nearly straight, 4-5 mm. long; palea a minute nerveless scale about .3 mm. long.

The type specimen is *Suksdorf* 135, collected on wet rocks near Rooster Rock, Multnomah County, Oreg., July 16, 1885. This is in the National Herbarium. (Pl. XX.)

DISTRIBUTION: British Columbia to Arizona.

VANCOUVER ISLAND: *Macoun* 82. WASHINGTON: Clallam County, *Elmer* 1953, Falcon valley, *Suksdorf* 132; Seattle, *Henderson* 2113 (this specimen has a decumbent and rooting base); Whatcom County, *Suksdorf* 1184; Bingen, *Suksdorf* 2829. OREGON: Yamhill County, *Shear* 1633, 1636, 1639, 1643, 1646; Roseburg, *Howell* 216, 217 in 1887; Portland, *Bolander* in 1886; Umpqua valley, *Howell* 218; Washington County, *Howell* 53 in 1881. CALIFORNIA: *Bolander* 4801, 6079; Mendocino County, *Davy and Blasdale* 5199, 5262, 6118; *Brown* 779; Placer County, *Palmer* 2420; Middle Tule River, *Purpus* 5638. ARIZONA: Santa Rita Mountains, *Pringle* in 1884.

Many of the specimens referred here have a more dense panicle than the type but differ from the large forms of *A. microphylla* in having a more verticillately lobed panicle and less awn-pointed glumes. From *A. exarata* this species differs in possessing the awn and in the less scabrous glumes. A few specimens seem to be intermediate between this and the other two species. From *A. longiligula* it differs in the shorter ligule and in the short flower-bearing branches of the panicle.

This species appears to be the *A. virescens* of Thurber in Botany of California, page 274, but differs from *A. virescens* H. B. K. in the longer awn, more spreading panicle, and stouter culms.

*bb. Flowering glume awnless or the awn included.*

### 16. *A. exarata* Trin.

*A. exarata* Trin., Gram. Unifl. 207. 1824. "(Paniculae contractiusculae) radiis 3, 4, a basi floriferis, hispidis: perianthio mutico glumis acuminatis  $\frac{3}{4}$

breviori: valvula superiore parva; foliis lanceolato-linearibus, planis. V. spp. ex Unalaska, unde retulit cl. Dr. Eschholz. (Valvula inferior dorso exarata.)”

In the Trinius herbarium there are three specimens of *A. exarata*, parts of all of which are deposited in the National Herbarium; one collected by Kostalsky in Unalaska in 1829 (Pl. XXI, fig. 1), one collected at Sitka by Mertens in 1829, and one collected at Sitka by Eschholz in 1826. None of these is the type specimen that was collected in Unalaska by Eschholz before 1824. If the type is in the Trinius herbarium I overlooked it. The specimens indicated above are mentioned in his subsequent work, *Agrostidea* II.

*A. grandis* Trin., Mem. Acad. St. Petersburg., Ser. VI, 6<sup>2</sup>: 316. 1841. (*Agrostidea* II: 70.) “Columbia (Hooker).” This is based upon a large panicle only. This form is common. The panicle is stout, long, and rather dense, usually interrupted below, as much as a foot long. The plant is stout, with leaves 6 or 8 mm. wide. In the National Herbarium are spikelets from Trinius’ specimen in the herbarium of the St. Petersburg Academy and also a photograph of the single panicle, which I examined in the Trinius herbarium, labeled “Columbia N. W. Amer., No. 376. of Hook. Cat.” The empty glumes are 2 mm. long, slightly unequal, acuminate, scabrous on keel. The flowering glume is about two-thirds of the length of the outer glumes, unawned. (Pl. XXI.)

*A. asperifolia* Trin., Mem. Acad. St. Petersburg., Ser. VI, 6<sup>2</sup>: 317. 1841. (*Agrostidea* II: 71.) In the Trinius herbarium there is a single culm representing the upper part of the plant, which is labeled “T. 182.” This represents a somewhat larger paniced form than *A. exarata*, but does not differ in essentials. (Pl. XXI, fig. 2.)

*A. exarata asperifolia* Vasey, U. S. Dept. Agr., Div. Bot., Bul. 13; No. 31. 1892. Described as a form, but with no reference to synonyms. “California to Washington.”

*A. exarata minor* Hook., Fl. Bor. Am. 2: 239. 1840. “Periantho univalvi *A. drummondii* Torrey, mst. Valleys of the Rocky Mountains on the east and on the west side of the dividing ridge. Drummond. Douglas.” I have examined the specimens of Drummond and Douglas in the herbarium of Kew, and take them to be only small forms of *A. exarata*. These two specimens are further referred to in Hooker, *Flora Antarctica* 2: 373, 1847, in a note on *A. tenuifolia* Bieb. var. *Fretensis*. “Intermediate between them is a common Rocky Mountain species, collected by Douglas and described as *A. exarata* in the ‘Flora Boreali-Americana’ (vol. 2, p. 239). There are, however, two forms of *A. exarata*; one from the east side of the Rocky Mountains, which has the scabrid broader leaves of the true *A. exarata* and a distinct upper palea (this is the *A. drummondii* Torrey Ms.); the other (or Douglas’) from the west side of the dividing ridge is smaller, more slender, with small locustae, and no upper palea. It agrees closely with the Magellanic plant in size and foliage, and bears the name of *A. tenuifolia* ? Bieb., appended to it by Doctor Torrey.” Duplicates of the same, mounted on one sheet, are deposited in the Torrey herbarium at the New York Botanical Garden.

*A. scouleri* Trin., Mem. Acad. Sci. St. Petersburg., Ser. VI, 6<sup>2</sup>: 323. 1841. (*Agrostidea* II: 83.) “Notka Sund. (Hooker).” The type specimen is in the herbarium of the St. Petersburg Academy of Sciences. It consists of a single culm, with a small panicle, labeled “Notka Sound T. 145.” This species has been much misunderstood by American botanists, and the name has usually been applied to some form of *A. pallens*, from which it differs in the presence of the small palea. Trinius’ statement that “valvula \* \* \* superior ovarium aequante” has been questioned, but his type specimen shows a small palea. The type shows no rhizome and an awnless flowering glume. (Pl. XVI, fig. 2.)

*A. albicans* Buckley, Proc. Acad. Nat. Sci. Phila. 1862: 491. 1863. “Oregon Columbia Woods Nuttall.” Type seen in herbarium of the Philadelphia Academy of Natural Sciences, but Doctor Gray, in his remarks upon Buckley’s plants (Proc. Acad. Nat. Sci. Phila., 1862, p. 334), says that this was “named by Nuttall *A. oregonensis*,” slightly altering the name from what it appears on Nuttall’s label.

*A. tenuifolia* Bieb. This name was mentioned by Prof. F. L. Scribner in an article on some grasses collected by Frank Tweedy (“A List of Grasses from Washington Terr.,” Bul. Torr. Bot. Club, 10: 63, 1883) as follows: “*Agrostis tenuifolia*, Bieb., Trin. Icon. 3. t. 65. This appears like a slender, narrow-leaved awnless form of *Agrostis exarata*, and has been so referred (No. 1127 Kellogg & Hartford). It seems to be a well-marked species, however, and so



well accords with Trinius' figure of *A. tenuifolia* that I have little hesitation in referring it to that species. As I understand *A. exarata*, I am not prepared to unite this species with it." Tweedy's specimen is *A. exarata*. I have referred doubtfully to *A. exarata* a specimen collected by Pringle at Summit Valley, Sierra Nevada Mountains, California, September 22, 1882, at an altitude of 8,000 feet, and which closely resembles Trinius' figure of *A. tenuifolia*. The whole plant is tufted and delicate, with narrow, flat leaves. *A. tenuifolia* is described as having involute leaves.

Culms erect, from 20 to 30 cm. to 1.5 m. in height, tufted but without rhizomes. Blades short, narrow, and upright, or long, wide (5 mm. or even more) and lax, very scabrous. Panicle erect, 5-30 cm. long, contracted and spikelike or loose and somewhat spreading, but the branches almost always densely flowered, very scabrous, spikelet-bearing nearly to base. Spikelets pale, rarely purple: empty glumes equal or the lower slightly longer, acute, acuminate or sometimes sharp-pointed, 2.5-3.5 mm. long, ciliate-scabrous on the keels and often scabrous on back; flowering glume about 2 mm. long, the midnerve usually excurrent above the middle as a tiny point or prickle, rarely with a short, straight awn; palet small, about .3 mm. long. (Pl. XXIII.)

Besides the form with robust panicle described by Trinius under *A. grandis* is one with panicle close and spikelike resembling *Muhlenbergia racemosa* Michx.) B. S. P. of the Eastern States. (Pl. XXIII. A.) However, these forms are all connected by numerous transition specimens so that it is impossible to segregate them even as subspecies.

DISTRIBUTION: Alaska to Mexico. The following are a few specimens to represent distribution:

ALASKA: Yes Bay, *Howell* 1710; Unalaska, *Evans* 518; Juneau, *Coville and Kearney* 2473. BRITISH COLUMBIA: Chilliwack valley, *Macoun* 26038; Alberta, *Macoun* 18612. WASHINGTON: Montesano, *Heller* 3967, Pullman, *Piper* 1759. OREGON: Blue Mountains, *Shear* 1692, *Howell* 217, *Cusick* 804. IDAHO: Hailey, *Henderson* 3269. MONTANA: Black Hawk, *Rydberg* 3275; Helena, *Shear* 385. WYOMING: Bear Lodge Mountains, *Williams* 2663; Albany County, *E. Nelson* 472. NEBRASKA: Thomas County, *Rydberg* 1492. COLORADO: Silverton, *Shear* 1227; Pagosa Peak, *Baker* 147; Mancas, *Tracy* 4325. UTAH: Aquarius Plateau, *Ward* 742; Ogden, *Tracy* 324. NEVADA: Humboldt Mountains, *Watson* 1283; Reno, *Tracy* 226. CALIFORNIA: Mount Shasta, *Palmer* 2634; Santa Rosa, *Heller* 5654; New York Falls, *Hansen* 613. ARIZONA: *Toumey* 135; *Lemmon* 3159. NEW MEXICO: *Wright* 1969, 1970; Santa Fe, *Vasey*. MEXICO: State of Chihuahua, *Pringle* 1421. It has also been collected in Wisconsin, but this is out of its range and is probably an accidental specimen.

*A. grandis* is well represented by—CALIFORNIA: *Hansen* 1826; *Davy and Blasdale* 6053. WASHINGTON: *Elmer* 1952. COLORADO: *Shear and Bessey* 1441. The form with spikelike panicle by—CALIFORNIA: *Palmer* 2634. NEVADA, *Tracy* 218. OREGON, *Griffiths and Morris* 907. WASHINGTON, *Piper* 1759.

#### 17. *A. rossæ* Vasey.

*A. varians* Trin., Mem. Acad. St. Petersburg, Ser. VI, 6<sup>2</sup>: 314. 1841. (Agrostidea II: 68.) "America boreal? (Hooker 217)." Not *A. varians* Thuill., Fl. Paris 1790, which Trinius refers to *A. canina* L. The type specimen is in the Trinius herbarium in the St. Petersburg Academy of Sciences, and is labeled "T. 217." A portion of the type is deposited in the National Herbarium. In the Torrey herbarium is a duplicate type collected on summit of Grass Hill, Rocky Mountains, by Hooker, No. 217. (Pl. XXIV, fig. 2.)

Trinius, in his description of *A. varians*, seems to have included *A. humilis*, as he describes the palet as being absent, or, if present, nearly as long or about half as long as the flowering glume. The type specimen, however, shows only a very minute palet.

*A. rossæ* Vasey, Contr. U. S. Natl. Herb. 3: 76. 1892. "Collected in the Yellowstone Park, Wyo., by Miss Edith A. Ross." There are but two sheets of this (the type specimen) in the National Herbarium, collected July, 1890, but I do not see that the plants differ essentially from *A. varians* Trin. (Pl. XXIV, fig. 1.)

The type *A. rossæ* differs from the type of *A. varians* in having more scabrous panicle branches and wider scabrous leaves. More material may show that these forms may be kept separate. There is considerable variation in what I have referred to *A. varians*, in the width of the leaves and the roughness of the panicle. Furthermore it is difficult to separate *A. varians* from *A. exarata*. Both these species are found commonly in the Yellowstone Park, from which comes the only specimen we have seen of *A. rossæ*. For these reasons I have united *A. varians* and *A. rossæ*, taking up the latter name because the former is untenable.

*A. variabilis* Rydb., Mem. N. Y. Bot. Gard. 1: 32. 1900. Gives a new name to *A. varians* Trin.

Culms low but comparatively stout, 10–20 cm. high or rarely more, usually densely tufted from a perennial root, but without rhizomes. Blades short, 1 or 2 on the culm, and numerous at the base, 2–5 cm. long or sometimes more, 1–2 mm. wide, flat or conduplicate; sheaths rather conspicuous, especially the basal. Panicle contracted, 3–6 cm. long, about 5 mm. wide, branches appressed, the lower sometimes 2–2.5 cm. long, but usually short. Spikelets green or purple, 2 mm. long; empty glumes nearly equal, acute, scabrous on keel and somewhat on back; flowering glume 1.5 mm. long, awnless, a few short hairs at base; palea very minute. (Pl. XXIV, fig. 2.)

DISTRIBUTION: Washington to California and Wyoming at high altitudes.

WASHINGTON: Mount Rainier, Piper 1978, 1980, 2559; Olympic Mountains, Elmer 1948; Mount Adams, Suksdorf 14, 139; Skamania County, Suksdorf 1020; Okanogan County, Elmer 730; Nason Creek, Sandberg and Leiberg 656. OREGON: Stein's Mountains, Griffiths and Morris 562, 595, 615; Ashland Butte, Howell, 224; Eagle Creek Mountains, Casick 1073; Wallowa Lake, Shear 1769. CALIFORNIA: Soda Springs, Jones 323; Summit valley, Pringle in 1882; San Bernardino Mountains, Parish 3302; (without locality), Bolander 5070. IDAHO: Bear Creek, Leiberg 2958. UTAH: Rabbit valley, Ward 741. WYOMING: Ten Sleep Lakes, Williams 2952½, 2964, 2967; Yellowstone Park, Tweedy 605; Battle Creek Mountain, Nelson 4070.

This may be only an alpine variety of *A. exarata* into which it seems to pass. The panicle, however, does not always have the numerous short branches spikelet-bearing at the base, although it is quite narrow. The outer glumes are not scabrous on the back as is usually the case with *A. exarata*, nor is it so conspicuously hispidulous on the keel. Transitions to *A. exarata* are shown by such forms as the specimens from Stein's Mountains, Oregon, collected by Griffiths and Morris.

== Panicle open, sometimes diffusely spreading.

a. Awn of flowering glume attached near the base.

#### 18. *A. howellii* Scribn.

*A. howellii* Scribn., Contr., U. S. Natl. Herb. 3: 76. 1892. "Near Hood River, Oregon (No. 198, Howell)." The type specimen is in the National Herbarium, collected August 5, 1886. (Pl. XXV.)

Culms erect or decumbent at base, 40–60 cm. high. Blades lax, very long, 3–5 mm. wide, as much as 30 cm. long. Panicle loose and spreading, scabrous, 10–30 cm. long. Spikelets pale, clustered toward the ends of the branches.



Empty glumes equal, acuminate, rather narrow and firm in texture, somewhat scabrous on keel, 3 mm. long; flowering glume 2.5 mm. long, acute, awned; awn attached to back near base, exerted, bent, about 6 mm. long; palet none.

DISTRIBUTION: OREGON, *Howell* 198; Bridal Veil, *Suksdorf* 134.

The Suksdorf specimens have a more compact panicle, resembling *A. foliosa*, but agree in having the awn inserted near base of glume. This species is not sufficiently known.

aa. Awn, if present, attached at or above the middle of the glume.

b. Panicle very diffuse; branches capillary, very scabrous, the primary branching above the middle; spikelets clustered toward the ends of the smaller branches. In arctic and alpine forms the characters are less plainly shown.

### 19. *A. hiemalis* (Walt.) B. S. P.

*Cornucopia hiemalis* Walt., Fl. Car. 73. 1788. "Culmo erecto panicula diffusa verticillata, foliis angustis subrectibus." The description scarcely suffices to identify the species, but Michaux (*Flora* 1: 41, 1803) states that this is the same as his *Trichodium laxiflorum*. Furthermore, Walter describes two other species, *C. perennans* and *C. altissima*, so that there is little doubt that *C. hiemalis* is the common *A. scabra* Willd. The plant is not represented in Walter's herbarium and consequently there is probably no type specimen in existence.

*A. scabra* Willd., Sp. Pl. 1: 370. 1798. "Habitat in America-boreali." The type specimen is in the herbarium of the Botanical Garden of Berlin. There are three panicles representing the ordinary form.

*Trichodium laxiflorum* Michx., Fl. 1: 42. 1803. "Hab. in humidis et pratensibus a sinu Hudsonis ad Floridam." There is a good plate of this. *Cornucopia hiemalis* Walt. is cited as a synonym. The type specimen is in the Michaux herbarium of the Museum of Natural History at Paris. There are the upper portions of several plants of the usual eastern form. (Pl. XXVII, 3.)

*A. laxiflora* Poir., Encycl. Suppl. 1: 255. 1810. "Cette plante croît dans la Caroline, où elle a été recueillé par M. Bosc." I found the type of this in M. Cosson's herbarium, Paris.

*Trichodium scabrum* Muhl., Cat. Pl. 10. 1813. "Pens. fl. Jun. Cher." There is a mixture of specimens in Muhlenberg's herbarium, but since he gives as synonym *A. scabra* Willd. his name must go here, though the description in his *Descriptio Graminum* seems to apply to *A. perennans*.

*A. laxa* Schreber "Gram." is given as a synonym of *Trichodium laxiflorum* by Pursh *Flora* 1: 61. 1814, and hence must apply to this species regardless of the plants so labeled in the Berlin Herbarium.

*A. sericea* Ell., Sk. 1: 135. 1816. The description applies to a *Muhlenbergia* (*M. capillaris* Kunth), but Mr. E. D. Merrill states that the specimen in Elliott's herbarium is *A. hiemalis* (U. S. Dept. Agr., Div. Agros., Circ. 29, 1901). In such cases the specimen should not be taken as the type.

*A. laxiflora* Richardson, Franklin Voy. 731 (App. 3). 1823. Transfers *Trichodium laxiflorum* Michx. Richardson's specimen is in the herbarium of the British Museum, labeled "Lake Winipeg and Superior."

*A. michauxii* Trin. Unif. 206. 1824. var. (see under *A. perennans*). "Panicula breviori, radiis brevioribus hispidulis." Under this are given two sub-varieties, both of which are probably *A. hiemalis*. " $\alpha$  Panicula patente, foliis linearibus." based on *Trichodium laxiflorum* Michx. " $\beta$  Panicula contractiuscula, foliis latioribus: *Agrostis* (Trichod.) *clavata* Tr. in Spreng. n. Entd. II, p. 55. V. spp. Camtsch." This last form was made a species later, *Trichodium clavatum* Schult., Mant. 3: 556. 1827. In the Trinius herbarium there is a specimen of this collected by Kostalsky in 1829, marked "A michauxii m. b. A. clavata Trin. ap. Spreng. N. Entd. II." A portion of this is deposited in the National Herbarium. (Pl. XXVII, 2.)

*A. abakanensis* Lessing is mentioned as a synonym under *A. michauxii* by Trinius. Mem. Acad. St. Petersb. Ser. VI, 6<sup>2</sup>: 325. 1841.

*Trichodium laxum* Schult., Mant. 2: 157. 1824. Based on Muhlenberg's *Trichodium laxiflorum*, which name Schultes changes because of *T. laxiflorum* Michx., which he considers different. He also wishes to take up the specific name *laxa* (*Agrostis laxa* Schreb.). The culm is described as erect and the "habitat

in arvis siccis, floret Maio." An examination of Muhlenberg's herbarium shows the following as to the species of *Trichodium* described by him in his *Descriptio Ueberior Graminum*:

1. *Trichodium laxiflorum* = *A. hiemalis*.

2. *Trichodium decumbens* = *A. perennans*, the weak form.

3. *Trichodium scabrum* = *A. hiemalis* (as to name). In the herbarium there is a mixture of several grasses, one of which is *A. hiemalis*.

4. *Trichodium* (no specific name). I have been unable to determine from his herbarium what grass was referred to, but it is probably the stout form of *A. perennans*.

*A. scabra tenuis* Tuckerm., Amer. Jour. Sci. 45: 45. 1843. "Vaginis scabris panicula tenui ramis erectis." "A small delicate form with a very slender panicle. Rocks of the Flume, Lincoln, N. H."

*A. laxiflora capspitosa*, Torr. Fl., N. Y., 2: 442. 1843.

*A. scabriuscula* Buckl., Proc. Acad. Nat. Sci. Phila. 1862: 90. 1863. The type specimen is in the herbarium of the Philadelphia Academy of Natural Sciences. Doctor Gray in his remarks upon Buckley's plants (l. c., 334) states that this was "ticketed by Nuttall *Agrostis scabrata*."

*A. hiemalis* B. S. P., Prel. Cat N. Y. 68. 1888. Gives new combination with reference to synonym *A. scabra* Willd.

Culms slender, tufted or scattered, 20-80 cm. high. Blades narrow and usually short, sometimes 2-3 mm. wide, but often very narrow, almost setaceous; sheaths striate, the upper usually somewhat inflated and inclosing the base of the panicle; panicle large and very diffuse, in the larger forms 50-60 cm. long, the branches long and capillary, very scabrous. Spikelets crowded toward the tips of the branchlets, pale or usually purple; empty glumes nearly equal or the lower slightly longer, 1.5-2 mm. long, acute or acuminate, scabrous on keels, especially the lower; flowering glume obtuse two-thirds to three-fourths as long as empty glumes, usually awnless; palea, none or minute. (Pl. XXVI, fig. 2.)

In typical forms the panicle is in flower and wide spreading at the upper part, while the base is still inclosed in the upper sheath, the branches of the lower exerted portion being numerous and appressed-ascending; later the entire panicle is exerted and the branches wide spreading; at maturity the panicle breaks away from the plant and rolls before the wind. (Pl. XXVI, fig. 1.)

DISTRIBUTION: Throughout North America from the arctic regions southward into Mexico.

In the mountains of New England is a form which has awned spikelets. I have examined this form in the White Mountains of New Hampshire and am unable to separate it as a species. At higher altitudes there is a tendency to form tufts with numerous slender radical leaves, but these characters are not at all constant. The awn when present varies in length and springs from the back of the flowering glume. (Pl. XXVII, 5.) This form has been named—

*Trichodium montanum* Torr., Comp. 50. 1826. "Mountains." Torrey's specimen is in the Torrey herbarium at the New York Botanical Garden. It has the tuft of setaceous leaves at base, but the flowering glume is awnless. Type specimen collected on "summit of the New Beacon Fishkill."

*A. oreophila* Trin., Mem. Acad. St. Petersburg., Ser. VI. 6<sup>2</sup>: 323. 1841. (*Agrostidea* II: 77.) "Bethlehem Pennsylvania (Moser)." Trinius gives as synonym *Trichodium montanum* Torr. This disposition is also made by Doctor Gray (Manual, Ed. 1). The species in the Trinius herbarium is, however, a small erect form of *A. perennans* Tuckerm. Trinius's description agrees with this specimen. Hence *A. oreophila* Trin. should be considered as a synonym of *A. perennans* Tuckerm., and the citation of *Trichodium montanum* Torr. was an error, arising from the fact that the specimen was sent to him under the last-mentioned name. Trinius probably intended to change the name on account of a previous *A. montanum*.

*A. laxiflora montana* Tuckerm., Am. Jour. Sci. 45: 43. April to June, 1843. Not *A. montana* Krock., Fl. Siles. 1: 110, 1787, nor R. Br. 1: 171, 1810. Tuckerman's specimen is in the Gray herbarium.

*A. torreyi* Tuckerm., Hovey's Mag. Hort. 9: 143. April, 1843. Not *A. torreyi* Kunth, Enum. 1: 226, 1833, which is a *Muhlenbergia*.

Other specimens occur, mostly from the Eastern States, in which the flowering glume is awned, but in which this is not co-ordinated with other characters by which the specimens may be referred to any particular form or subspecies. Certain plants from Labrador (Waghorne 37 and Allen 23) resemble Tuckerman's *A. torreyi*.

A robust leafy form occurs especially in the Western States, from Washington to Arizona Territory. This passes into the following subspecies:

***A. hiemalis subrepens* subsp. nov.**

Culms erect, tall and robust, about 1 m. high, provided with rhizomes. Panicles with relatively shorter branches. Spikelets 2.5 mm. long; flowering glume 1.6 mm. long; palea minute (.2 mm. long).

Type specimen in National Herbarium collected by C. G. Pringle in wet places, pine plains, base of Sierra Madre Mountains, State of Chihuahua, Mexico, September 28, 1887 (No. 1420).

I have referred the following to this, although the specimens do not in all cases show rhizomes or decumbent rooting bases on account of scanty material.

NEW MEXICO: Near Cloverdale, *Mearns* 490. NEVADA: Ruby Valley, *Watson* 1282. ARIZONA: Santa Catalina Mountains, *Toumey* 5 in 1894; *Pringle* in 1881; Rincon Mountains, *Nealley* 175; Tucson, *Toumey* in 1892. MEXICO: Chihuahua, *Townsend and Baker* 276. VENEZUELA: *Fendler* 2541.

***A. hiemalis geminata* (Trin.) comb. nov.**

*A. geminata* Trin., Gram. Unif. 207. 1824. "V. spp. ex Unalasccha, unde retulit cl. Dr. Eschholz." The type specimen of this is in the Trinius herbarium. A portion is deposited in the National Herbarium. The plate in Trinius's Spec. Gram. 1: 28 is characteristic.

In the type specimen the culm is 20 cm. high, panicle loose but not diffuse, 5 cm. long, divaricately branching, flowering glume provided with a scarcely exerted straight awn. In all other particulars it agrees with *A. hiemalis*. (Pl. XXVIII, fig 1.)

Unalaska, Eschholz (type). Specimens from Juneau, *Brewer and Coe* 574, and *Piper* 4622 at Kadiak and 4623 at Sitka, nearly match this, but all the other specimens have a large and more diffuse panicle, thus approaching *A. hiemalis*. Those from Alaska are: Juneau, *Cole* in 1899, *Trelease and Saunders* 2900; *Coville and Kearney* 2461, 2509. A specimen from Chilliwack valley, British Columbia (*Macoun* 26036), and another from Pagosa Pass, Colorado (*Baker* 37), have the awn, but a more diffuse panicle.

Closely agreeing with *A. geminata*, but flowering glume awnless, is a specimen collected at Ratz Harbor, Prince of Wales Island, No. 2014, J. B. Flett, July 31, 1901. "growing in moss on old logs projecting into a lake." (Pl. XXVIII, fig. 2.)

The following specimens may be placed here, although they are connected with *A. hiemalis* by a series of intergrades:

BRITISH COLUMBIA: Rogers Pass, *Macoun* 2 in 1890; Chilliwack valley, *Macoun* 26041. WASHINGTON: Mount Rainier, *Allen* in 1894. MONTANA: Little Belt Mountains, *Rydberg* 3390; Crazy Mountains, *Rydberg* 3444. WYOMING: Yellowstone Park, *Merrill* 141, 142, *Tweedy* 607, *Ross* in 1890; *Williams* 2938. CALIFORNIA: Lassens Peak, *Jones* in 1897; Kern River, *Rothrock* 323. COLORADO: Pagosa Peak, *Baker* 40 c; Buffalo Pass, *Shear and Bessey* 1453.



A form of *A. hiemalis* occurring from Alaska to Newfoundland has been described as:

*Trichodium album* Presl, Rel. Haenk. 1: 244. 1830. "Hab. in sinu Nutkaensis." The type specimen is in the Presl herbarium at Prague. There are three plants mounted on the sheet; one is the ordinary form of *A. hiemalis*; a second is *A. exarata*; while the third is a taller form of *A. hiemalis* with the branches of the panicle appressed and the culm decumbent at base. This is the same as has been distributed to other herbaria under the name of *Trichodium album* and is the specimen that I take as the type. (Pl. XXVII, fig. 1.)

*A. nutkaensis* Kunth, Enum. 1: 222. 1833. "Sinus nutkaensis." Based on *Trichodium album* Presl. The spelling was changed by Trinius (Mem. Acad. St. Petersburg, Ser. VI, 6<sup>2</sup>: 326, 1841. Agrostidea II: 80) to *A. nootkaensis*.

The following specimens can be referred to this form fairly well:

ALASKA: Unalaska, *Piper* 4625; Kadiak Island, *Trilease*, 2901, 2902, 2904; *Evans*, 454, *Piper*, 4624; Yes Bay, *Howell*, 1711; Popof Islands, *Saunders* in 1899, *Kincaid* in 1899; Fort Sampson, *Kellogg*, 103; Kenai, *Nielson*, 51. NEWFOUNDLAND: *Waghorne*, 11, 12. LABRADOR: *Waghorne*, 23, 36.

In the National Herbarium are several dwarf specimens from Newfoundland, Labrador, and Alpine regions of the western mountains which appear to be *A. hiemalis*, but can not be definitely referred to any form above mentioned; for example, *Waghorne* 25, Newfoundland. (Pl. XXVII, fig. 4.)

bb. Panicle open, but not conspicuously diffuse; branches more or less capillary.

c. Flowering glume awnless.

## 20. *A. idahoensis* Nash.

*A. tenuis* Vasey, Bul. Torr. Bot. Club, 10: 21. 1883. Not *A. tenuis* Sibth., 1794. "Collected on the San Bernardino Mountains, California, by the Parish brothers." The type specimen (No. 1085) is in the National Herbarium. (Pl. XXIX, fig. 2.)

*A. idahoensis* Nash, Bul. Torr. Bot. Club, 24: 42. 1897. "Collected by A. A. and E. Gertrude Heller, at Forest, Nez Perces County, Idaho." The type specimen is the one from which Mr. Nash drew up the description, and is probably at the New York Botanical Garden. Duplicate types are in the National Herbarium and in several other herbaria. The one in the National Herbarium was collected July 16, 1896, at an altitude of 3,500 feet (No. 3431). This is about intermediate between *A. tenuis* Vasey and the subspecies *recta*. (Pl. XXIX, fig. 1.)

*A. tenuiculmis* Nash, Mem. N. Y. Bot. Gard. 1: 32. 1900. Those who give the legal aspect prominence may insist that there is not sufficient evidence for citing Nash as the author of *A. tenuiculmis*, but it is evident that he intended to change the name. It is based upon the following, in Rydberg's Flora of Montana (Mem. N. Y. Bot. Garden 1: 32): "*Agrostis tenuiculmis recta* Nash; *Agrostis tenuis erecta* Vasey, mss: not *A. erecta* Spreng. *Agrostis tenuis* Vasey, Bul. Torr. Bot. Club, 10: 21 is antedated by *A. tenuis* Sibth., 1794, consequently both the specific and varietal name must be changed. It is a small plant with a small panicle and erect or ascending rays and no palet."

Furthermore, *A. tenuis erecta* Vasey is a manuscript name and hence *A. tenuiculmis recta* Nash rests upon the brief description cited above. But, compared with the species *A. tenuiculmis*, the variety is a taller plant with upright stem and longer panicle.

*A. tenuiculmis recta* Nash, Mem. N. Y. Bot. Gard. 1: 32. 1900. Several localities are given in Montana and Yellowstone Park. Of the two specimens in the National Herbarium, probably named by Doctor Vasey *A. tenuis erecta*, one is from Washington State, collected by Suksdorf, 1883. The other from Oregon, Cusick, No. 1070, has a palet, and, though it looks similar to this, should be referred to *A. humilis*. I have therefore taken as the type of *A. tenuiculmis recta* Nash the Suksdorf specimen, which is numbered 48. This is a larger form, which differs in its taller culms, broader leaves, and often larger spikelets, but seems scarcely worth recognizing as a subspecies.

Culms slender, tufted from a perennial root, erect or geniculate at base, 10-30 cm. high. Blades narrow, one or two on the culm (1-6 cm. long), but mostly



basal, when they may be as much as 10 cm. long in the taller forms. Panicles loosely spreading, 5-10 cm. long, branches capillary, minutely scabrous. Spikelets about 1.5 mm. long, pale or purplish; lower glume slightly longer and more acute than the upper, scabrous on keel; flowering glume 1 mm. long, truncate, awnless; palelet minute, not more than .2 mm. long.

DISTRIBUTION: Washington to Colorado and California.

CALIFORNIA: Placer County, *Carpenter* in 1892; Fresno County, *Hall and Chandler* 603; *Palmer* 238 in 1888; Merced River, *Torrey* 567 in 1865; Mariposa County, *Congdon* in 1898; Lincoln Valley, *Kennedy and Doten* 195; Bear River, *Hansen* 2079; San Jacinto Mountains, *Hall* 784, 2363. WYOMING: Yellowstone Park, *Rydberg and Bessey* 3571, *Nelson* 6080, *Merrill* 148, 148½, *Rose* 699, *Tweed* 33, 606. MONTANA: *Knowlton* in 1887.

The following are more robust and have been referred by some authors to *A. tenuiculmis recta* Nash:

WASHINGTON: *Suksdorf* 48. OREGON: Umatilla, *Shear* 1661, 1664½. IDAHO: St. Marys River, *Leiberg* 1130. MONTANA: Belt Pass, *Rydberg* 3327½. WYOMING: Yellowstone Park, *Merrill* 130, 143, 147, *Rydberg and Bessey* 3572. COLORADO: Pagosa Peak, *Baker* 150. This last specimen is yet more robust and there is a short straight awn on the flowering glume.

### 21. *A. oregonensis* Vasey.

*A. oregonensis* Vasey, Bul. Torr. Bot. Club 13:55. April, 1886. "Root fibrous (annual?); culms about 2 feet high, somewhat slender, radical leaves filiform; culm leaves distant, narrow, soon tapering to a long, slender point, 3 to 4 inches long; ligule short; panicle 4 to 5 inches long, nodding and flexuous, open but not spreading; branches capillary, unequal, mostly in fives below, above in twos or threes, the longer about 2 inches long, all naked below, and rather numerous flowered above; pedicels slender, as long as, to two or three times as long as, the spikelets, which are about 1½ lines long, narrowly lanceolate, and gradually tapering to the acute point, slightly scabrous on the keel, rather thin and purple; flowering glume a little shorter than the empty ones, narrowly lanceolate, five-nerved, apex rather obtuse; palelet wanting. The panicle has a rich purple color, and it approaches the *A. scabra*, but is shorter, and with much shorter and erect branches and a firmer culm. Collected in Oregon by Mr. Howell." Type specimen in the National Herbarium, Howell 49. Panicle purple. Palelet present as a very small scale .2-.4 mm. long. (Pl. XIV, fig. 2.)

DISTRIBUTION: WASHINGTON: Marsh, Kittitas County, *Henderson* 2123; wet meadows, Skamania County, July 25, 1886, *Suksdorf* 198, 907; Copalis, Chelalis County, *Conard* 47; Clallam County, *Lawrence* 318. OREGON: *Howell* 3, 49. I have also referred here *Tweed*'s 36 from Teton Forest Reserve, Wyoming. We have not sufficient material of this species and it may be that it is only a form of some other species. It differs from *A. longiligula* in the shorter ligule and the absence of the awn. It seems to be too robust for *A. idahoensis*, and I find no indication of rootstocks except in *Henderson*'s No. 2123, which shows at least a rooting decumbent stem. The absence of rootstocks separates it from *A. pallens foliosa*.

There is an *A. oregonensis* Nutt., but this name has no valid standing. Doctor Gray, in his review of Buckley's new species says (Proc. Acad. Nat. Sci. Phila. 1862: 334, 1863): "*Agrostis albicans* is founded on a slender form of *A. exarata* Trin., named by Nuttall *A. oregonensis*."

To *A. oregonensis* I have also referred:

*A. attenuata* Vasey, Bot. Gaz. 2: 337. December, 1886. "Culms slender, smooth, erect, attenuated, 2 to 3 feet long; radical leaves narrowly linear, 2 to 4 inches long; culm leaves 3, distant, sheaths shorter than the internodes, smooth; ligule membranaceous, conspicuous, 2 to 3 lines long; blade 2 to 3 inches long, narrow, acuminate; panicle 3 to 4 inches long, pyramidal, lower branches in threes or fives, somewhat unequal, 1 to 2 inches long, capillary, few-flowered, pedicels mostly longer than the spikelets, which are about 1½ lines long;

empty glumes equal, oblong-lanceolate, acute, scabrous on the keel; flowering glume nearly as long; palet wanting. Found by Mr. Thomas Howell near Mount Hood, Oregon. It belongs to the scabra group, but is well distinguished as a species."

The type specimen is in the National Herbarium and was collected in the swamps, south side of Mount Hood (No. 210) by Thomas Howell, October 1, 1886. (Pl. XIII, fig. 2.) This has a slightly different aspect from *A. oregonensis*, but I am unable to find essential characters upon which to make a separation. The panicle is stramineous, probably due to age. The most noteworthy character is that the spikelets disarticulate below the glumes, but the specimen is past maturity. In the National Herbarium there is but one other specimen agreeing with this, Coville and Applegate 753, Salmon Prairie, Clackamas County, Oreg., September 3, 1897.

## 22. *A. schiedeana* Trin.

*A. schiedeana* Trin., Mem. Acad. St. Petersburg: Ser. VI, 6<sup>2</sup>: 327. 1841. (Agrostidea II: 81.) "Mexico, (Schrader)." The type specimen of this is probably in the Trinius herbarium, but I neglected to search for it.

*A. hallii californica* Vasey, Contr. U. S. Natl. Herb. 3: 74. 1892. This is based upon *A. elata* of the Botany of California (Watson, Bot. Calif. 2: 274. 1880.) The type specimen is, therefore, Bolander's 6103, which is in the National Herbarium. (Pl. X, fig. 1.) Torrey's plant from Lake Washoe, Nevada, may be the same, but our specimen shows only the upper part.

Culms tall, 60-100 cm., erect or slightly decumbent at base. Blades rather narrow, 2-3 mm. wide, upright, 10-15 cm. long. Panicle oblong, 10-30 cm. long, open, the branches in verticils, rather stiff and ascending, the lower whorls often numerous, the longer 5-10 cm. long and branching above the middle. Spikelets 2.5-3 mm. long; flowering glume 1.5-1.8 long; palet small, .2-.6 mm. long. (Pl. XXX.)

DISTRIBUTION: British Columbia to Mexico, in wet meadows.

BRITISH COLUMBIA: Vancouver Island, *Macoun* 81. WASHINGTON: Falcon Valley, *Suksdorf* 50, 189, 189a, 906; Lewis River, *Henderson* 2131. OREGON: White Horse Ranch, *Griffiths and Morris* 466. NEVADA: Quinn River Crossing, *Griffiths and Morris* 14 (grown in Grass Garden at Washington from seed). CALIFORNIA: Sierra Nevada Mountains, *Lemmon* in 1875; Bear Valley, San Bernardino Mountains, *Parish brothers* 1560. MEXICO: State of Mexico, *Pringle* 4485; Durango, *Palmer* 190. A specimen from Kadiak Island, Alaska (*George-son* 1 in 1898), appears to be this species. The spikelets are 3 mm. long. Another specimen from Bozeman, Mont., *Rydberg* 2218, has the flowering glume provided with an exerted bent awn.

This species has gone under the names of *A. hallii*, *A. scabra*, and *A. elata* on the Pacific coast. I may be wrong in referring our plants to *A. schiedeana*, as I have not seen the type, but the plants agree with Trinius's description. Pringle's and Palmer's specimens from Mexico have a palet about .6 mm. long, but it is a nerveless scale. (Pl. XXX, A.) The spikelets vary from 2.2 mm. to 2.7 mm. or even 3 mm. in the Alaska specimens. The specimens agree, however, in the shape of the panicle and the absence of rhizomes.

## 23. *A. perennans* (Walt.) Tuckerm.

*Cornucopia perennans* Walt., Fl. Car. 74. 1788. "Culmis subdecumbentibus; foliis latioribus; panicula longa diffusa, ramis trichotomis verticillatis. Gramen undique laeve, saccharinum, aestatem sustinens, in hyeme vigens, radicibus geniculisque se cito propagans. Donum inestimabile, conditore ad hanc diem, reservatum, hoc aevum, me instrumento, locupletatum."

*A. cornucopiae* Fraser, Gentleman's Magazine 59: 873. 1789. "Gathered in

South Carolina by Mr. Thomas Walter; even 500 miles up the country, Fraser. Sent to Linnæus from Canada by Professor Kalm." The article is entitled "Fraser's Carolina grass." A plate accompanies the description. As synonym is given *Cornucopia perennans* Walt. It is interesting to note that this was sent to Linnæus by Mr. Kalm, but I have not been able to find a reference to this in Linnæus's works. It seems strange that Linnæus did not describe either this or *A. hiemalis*, both of which are common in the Eastern States.

I have not seen the type specimen of this, and there probably is none in existence. In the herbarium of Mr. de Candolle at Geneva I saw a specimen labeled *Agrostis cornucopia* from "Carol. merid.," sent by Fraser. This may be taken as a duplicate type. It is the stout leafy form with rather large and heavy panicle and a decumbent base. There is a similar specimen in the herbarium of the Philadelphia Academy of Natural Sciences. Since Fraser was familiar with Walter's plants and states that this was collected in South Carolina by Walter, there seems to be no doubt that this is the same as *Cornucopia perennans* of Walter.

*A. anomala* Willd., Sp. Pl. 1:370. 1798. "Habitat in America boreali." Based on Walter's *Cornucopia perennans*.

*Alopecurus carolinianus* Spreng., Nach. Bot. Gart. Halle, 10, 1801. A specimen of this is in the Trinius herbarium labeled "*Alopecurus carolinianus* Spreng. ab ipso missus" and another labeled "alluvial banks Kentucky River, Robert Peter, M. D., Lexington, Ky." (Pl. XXXI, B.) I have not seen the type specimen.

*Trichodium decumbens* Michx., Fl. 1:42. 1803. "Hab. a Virginia maritima ad Floridam, præsertim ad ripas annuum, solo limoso hieme inundato." Type specimen in the Michaux herbarium at the Museum of Natural History at Paris. It is the common stout form and the label states that it is *Cornucopia perennans* Walt. The specimen does not show the base, but the description states that it is decumbent. (Pl. XXXII, B.)

Pursh's specimen of *Trichodium decumbens* Michx. in the Kew Herbarium is the small lax form.

*Trichodium perennans* Ell., Sk. 1:99. 1816. "Grows in damp, shaded places." Elliott gives as synonym *Cornucopia perennans* Walt., but Mr. E. D. Merrill, who has examined the specimen in Elliott's herbarium, says it is "a form of the grass now referred to *Agrostis altissima* (Walt.) Tuckerm." (U. S. Dept. Agr., Div. Agros., Circ. 29, 1901.) This disposition depends upon the identity of the latter plant. As Elliott's species is based on *Cornucopia perennans* Walt., I should refer this back to Walter's plant as interpreted by Fraser.

*Trichodium muhlenbergianum* Schult., Mant. 2:159. 1824. Based on Muhlenberg's *Trichodium* No. 4, which is probably some form of *A. perennans*.

*A. michauxii* Trin., Unif. 206. 1824. Under this Trinius places three varieties. Var.  $\alpha$  "Paniculæ longæ, amplioris, radiis elongatis, hispidissimis." This would be insufficient to identify the species, but he gives *Trichodium decumbens* Michx. as synonym.

*A. novboracensis* Spreng., Syst. 1:260. 1825. "Sylvæ Nov. Eboræ Torr." The description seems to apply better to *A. perennans* than to *A. hiemalis*. I have not seen the type specimen.

*A. schweinitzii* Trin., Mem. Acad. St. Petersburg, Ser. VI, 6<sup>2</sup>:311. 1841. (Agrostidea, II:65.) "*Trichodium elatum* Pursh (Schweinitz in hbio Martii) Pennsylvan." The specimen in the Trinius herbarium (Pl. XXXI, A) is not *T. elatum* of Pursh, but a lax form of *A. perennans*. However, since Trinius cites *Trichodium elatum* as synonym it might be claimed that this should be the type rather than the specimen in his herbarium. It is to be noted, however, that Trinius gives *Trichodium elatum* Pursh as a synonym of his *Agrostis elata*, described on page 71 of the same work. I therefore take as the type of *A. schweinitzii* the specimen in the Trinius herbarium. It is quite probable that Trinius means to say in the quotation above that his *A. schweinitzii* is the plant collected by Schweinitz and labeled (incorrectly) *Trichodium elatum* Pursh. This specimen appears to be the small form of this species, though only the upper part of the plant is present.

*A. oreophila* Trin., l. c. 323 (Agrostidea II:77). Trinius cites *Trichodium montanum* Torr. as a synonym, but the type specimen in the Trinius herbarium is a rather small but erect form of *A. perennans*. It is from Bethlehem, Pa., sent by Moser. (Pl. XXXII, A.) See note on this under *A. hiemalis*.

*A. perennans* Tuckerm., Am. Jour. Sci. 45:44. 1843. "Hab. Carolina, Walter, Fraser, Elliott, Curtis; Pennsylvania, Darlington; Columbus, Ohio, Sulli-



vant. The habit of this species is very marked, and it is pronounced 'quite distinct' by Doctor Darlington. It is probable that it does not occur very far to the north." As this is primarily a change of name, it is a typonym of *Cornucopia perennans* Walt.

I have been unable to find the specimens upon which Tuckerman based his descriptions of *A. perennans* and *A. nova-anglicæ*. The name *A. perennans* Tuckerm. should rest upon *Cornucopia perennans* Walt., but the description seems to refer to another form. As stated below, the species varies from the large upright stout form to a smaller lax decumbent form. These extremes seem quite distinct. From the description I think that Mr. Tuckerman had in mind the small form when he described *A. perennans* ("Culmis fere decumbentibus basi geniculatis ramosis glabris"). This was published in the American Journal of Science, July, 1843, in an article on the Trichodium section of Agrostis. In the same place he publishes *A. altissima* based on *Cornucopia altissima* Walt., to which he adds variety *laxa*. This is the stout large-panicked form which is described as *A. nova-anglicæ* in Hovey's Magazine of Horticulture, April, 1843.

*A. nova-anglicæ* Tuckerm., Hovey's Mag. 9: 143, 1843. Not *A. nova-anglicæ* Vasey, Contr. Natl. Herb. 3: 76, 1892, which is *A. borealis* Hartm. Tuckerman says "a stout, coarse grass of mountain brooks and wet rocks in the Notch of the White Mountains. It is wholly different from our other New England species, *A. laxiflora* and *A. scabra*; but the flowers agree so nearly with those of *A. altissima*, a southern species, that I have thought it was a variety of that plant. It differs, however, strikingly in habit." In his review of Trichodium section of Agrostis (Am. Jour. Sci. 45: 44, 1843) Tuckerman says under *Agrostis altissima*, " $\beta$  *laxa* (mihi); panicula laxiori ramis longioribus viridi. *A. nova-anglicæ* (mihi MSS.)." This would seem to indicate that the article in the American Journal of Science was written before that in Hovey's Magazine, although published a few weeks later. This is the large, leafy form found from New England to North Carolina, but it passes imperceptibly into the ordinary form and I am unable to distinguish it even as a subspecies.

*A. campyla* Tuckerm., Am. Journ. Sci., Ser. II, 6: 231, 1848. "Hab. New England, New York, Torrey, Pennsylvania, Muhl." Tuckerman's specimen in the Gray herbarium is the erect stout form.

*A. aphanes* Trin., Mem. Acad. St. Petersburg, Ser VI, 6<sup>2</sup>: 346. 1841. (Agrostidea II: 100.) "Terra nova. (Lapylæ, Kunth)." From the description this appears to be *A. perennans*.

*A. perennans aestivalis* Vasey, Contr. Natl. Herb. 3: 76. 1892. Type specimen collected by E. Hall at Athens, Ill., September, 1864. No specimen is indicated in the original description, but the range is given as Illinois, Tennessee, and westward. There are two specimens marked by Dr. Vasey, one from Illinois and one from Tennessee (Doctor Gattinger). I have taken the former as the type. (Pl. XXXII.) This is the small form. If this form is to be distinguished by a name it is probably best to take up *aestivalis* on account of the uncertainty of *A. schweinitzii* Trin.

*A. intermedia* Scribn., Bul. Torr. Bot. Club, 20: 476. 1893.

This species is described in a footnote accompanying an account of the flora of southeastern Kentucky. Appended to this article is a list of specimens. Two numbers are mentioned with *A. intermedia*, 39 and 174. The first would be the type. This was collected on the summit of Pine Mountain, Harlan County, Tenn., by T. H. Kearney, in 1893. Professor Scribner states that this species is intermediate between *A. clata* and *A. perennans*, his idea of the latter being the small, decumbent form. I have been unable to locate the type of this, but a duplicate type is in the National Herbarium.

The citation for *A. intermedia* has generally been given as Univ. Tenn. Agr. Exp. Sta. Bul. 7: 76. 1894. (Grasses of Tennessee, Pt. II.)

*A. pseudointermedia* Farwell, Ann. Rept. Com. Parks and Boulevards, Detroit, Mich., 11: 46. 1900. Gives new name to *Agrostis intermedia* Scribn. on account of *A. intermedia* Balb., Elencho 85. 1802.

*A. scribneriana* Nash, in Small Flora S. E. States, 126. 1903. Gives a new name to *A. intermedia* on account of *A. intermedia* Balb., but overlooks *A. pseudointermedia* Farwell.

Culms erect or more or less decumbent at base, varying from weak and lax to stout and tall, 30-100 cm. tall. Leaves rather numerous, the blades lax or stiffly upright, corresponding to the culms, 1-6 mm. wide, 10-20 cm. long.



Panicle open, oblong, branches ascending, branching again about the middle. Spikelets 2-3 mm. long; empty glumes nearly equal, acute or acuminate; flowering glume 1.5-2 mm. long, awnless; palea none or minute. (Pl. XXXI.)

In habit this species is quite variable. It is common in the Middle Atlantic States in autumn. It flowers later than any other species of *Agrostis* in the Eastern States (September to November). In open ground the culms are tufted, stout, and erect, with stiff, ascending branches of the panicle. In woodlands the culms are likely to be decumbent at base, while in deep shade or along brooks the culms and foliage are weak and lax, the former decumbent and spreading. The panicles in this form are more open, with fewer branches, which are sometimes conspicuously divaricately branched. In the large suite of specimens examined there are all gradations between these forms.

DISTRIBUTION: Maine and Minnesota to Florida and Texas. I have also referred to this species Liebmann 714 from Mirador, Mexico. A specimen from Wolf Creek, Tenn. (Kearney No. 953), has the flowering glume awned.

The plants we have from Japan labeled *A. perennans* differ from ours in having the panicle more compact, narrower, the branches shorter and more erect.

#### *A. perennans elata* (Pursh) comb. nov.

*Cornucopia altissima* Walt., Fl. Carol. 74. 1788. "Culmo erecto, duro; panicula coerctata; flor. magnis." This description is scarcely sufficient to identify the species, which is not represented in Walter's herbarium. The plant which I have referred to *A. elata* is quite rare and there are few specimens from the Carolinas, the region covered by Walter's Flora, and it certainly is not common. There does not seem sufficient evidence for taking up Walter's name, nor is it likely to be any better known in the future. The name is inserted here because later authors have assumed that this was *Trichodium elatum* Pursh. It is more likely to have been *Agrostis alba* L.

*Trichodium elatum* Pursh, Fl. 1: 61. 1814. "In sandy deep swamps; New Jersey, Carolina, etc." The type specimen, or at least one collected by Pursh, is in the herbarium at Kew.

*A. elata* Trin., Mem. Acad. St. Petersburg., Ser. VI, 6<sup>2</sup>: 317. 1841. (*Agrostidea* II: 71.) "Nov. Cæsar. (Gray et Greville.)"

The type specimen is in the Trinius herbarium at St. Petersburg. There are two plants mounted on the sheet, one from pine barrens of New Jersey, collected by Doctor Torrey and sent by Greville, 1835. The other, also from New Jersey ("Nov. Cæsar"), sent by Doctor Gray, 1835. The second would be the type, as it is the one first mentioned by Trinius. (Pl. XXXIII A.) Both specimens agree with Pursh's type. It may be best to consider this primarily a change of name, in which case the type is Pursh's plant.

*A. altissima* Tuckerm., Am. Jour. Sci. 45: 44. 1843. "Hab. Carolina, Walter, Curtis; New Jersey, Pursh, Torrey." Tuckerman refers to this. "T. n. 4 (anon.) Muhl. Gram., p. 52 (fide Torr.)" I should consider this primarily a change of name and that Tuckerman wished to take up Walter's *Cornucopia altissima* and transfer it to the genus *Agrostis*.

This differs from *A. perennans* in the more slender and elongated culms, often decumbent at base, but particularly in the crowding of the spikelets toward the ends of the branches, which gives them a more drooping appearance. (Pl. XXXIII.)

DISTRIBUTION: Swamps, New Jersey to Mississippi.

NEW JERSEY: *Scribner* in 1881; Pines, *Leggett* in 1873; Atlantic County, *Gross* in 1883; Tom's River, *Porter* in 1870; Egg Harbor, *Vasey* in 1884. MARYLAND: Brackish marsh, Ocean City, *Hitchcock* in 1902. VIRGINIA: Low ground, burnt-over pine lands, *Warburton* in 1903. NORTH CAROLINA: *M. A. Curtis* (Torrey herb.). SOUTH CAROLINA: *M. A. Curtis* in 1851 (Torrey herb.). ALABAMA: Gateswood, *Tracy* 8371. MISSISSIPPI: Biloxi, *Tracy* 3864, 4555; in pine woods clearing, Pass Christian, *Langlois* in 1882; among bushes in open marshes,

Waynesboro, *Kearney* 137; growing in hummocks in shaded pine barren bog, Nicholsen, *Kearney* 382.

cc. *Flowering glume awned.*

#### 24. *A. canina* L.

*A. canina* L., Sp. Pl. 62. 1753. "Habitat in Europæ pascuis humidiusculis." Type specimen in the Linnæan herbarium. *Agralus caninus* Beauv., *Agrost.* 5. 1812. Refers *A. canina* L. to this new genus.

*Trichodium caninum* Schrad., Fl. Germ. 1: 198. 1806. Gives description and cites *A. canina* L. ex Willd. as synonym. Gives six varieties.

Culms tufted, 30–50 cm. tall. Blades mostly short and narrow, those of the culm 3–6 cm. long, usually not over 2 mm. wide. Panicle loose and spreading, mostly 5–10 cm. long. Empty glumes equal, acute, 2 mm. long, lower minutely scabrous on keel; flowering glume a little shorter than the empty glumes, awned on the back about the middle, awn exserted, bent, callus minutely hairy; palet none. (Pl. IX, fig. 2.)

This species is apparently not native in this country. It is in cultivation under the name of Rhode Island bent and has escaped along roadsides and fields. Our specimens in the National Herbarium are all from the Northeastern States. This species resembles the awned forms of *A. alba*, from which it differs by the absence of the palet.

#### 25. *A. melaleuca* (Trin.) comb. nov.

*A. canina aenea* Trin., in Bong. Mem. Acad. Sci. St. Petersburg. Ser. VI, 1: 170. 1832. Veg. Sitka. Not *A. aenea* Spreng., Syst. Cur. Post. 337, 1827. For note concerning date see *A. aequalvis*. The original descriptions of this and some other species appear in this work under *A. canina*, as follows: "191. *Agrostis canina* L., Tr. 1c, p. 208. *Trichodium caninum* Schrad., Roem. et Schult. II, p. 277. Planta nostrati ex toto simillima, præterquam quod spiculas nonnihil majores habeat. Sed in regionibus illis boreali-orientalibus et aliæ Agrostidis formæ inveniuntur, quæ, etsi partim floralium evolutione singulæ variant, tamen altera in alteram adeo transeunt, ut, quantumcumque extremæ tandem a primitivo *canina* typo recedant, nihilominus ejusdem varietates potius, quam totidem species peculiare constituere nobis videantur. In eo enim cunctæ conveniunt, quod folia radicalia angustissima, plerumque pl. min. capillaria, culmea latiora, plana, callum, ut in genuina *canina*, subepilem s. obsolete barbatum, radicem denique pl. min. repentem habeant; tametsi et *Agr. canina* nostras minime raro radice mere fibrosa inveniatur. Harum varietatum Sitchensium altera, genuinæ proxima, quam obflurum colorem.

*α aeneam* vocabimus, caninæ quidem floris structura, h. e. periantho glumis paulo breviori, valvula superiori subobsoleta, sæpissimeque arista longa et geniculata gaudens, tamen in aliis speciminibus hac aut penitus caret, aut illius loco setulam perbreve tantum emittit, floresque adeo magnos (genuina *canina* fere duplo majores) habet, ut eam primo intuitu cum var. *γ*. confunderes.

Alia est varietas, quæ, ob glumas purpurascendo-atras et valvulas albas.

*β melaleuca* dici poterit. Radix huic distinctius repens quam in *α*, et *γ*. Perianthium, in aliis ejusdem speciminibus, glumis paulo brevius, in aliis easdem æquans: in *illis* valvula inferior paulo supra medium emittit aristulam glumas vix excedentem, valvula superior autem, ut solet, minima est; in *his* valvula inferior mutica, superior adeo evoluta, ut inferiorem fere æquet. Utramque autem rem, aristam nimirum aut abbreviatam aut nullam, et in *Agr. canina* nostrate inveniri, valvulam superiorem vero etiam in *Agr. alpina*, *exarata* aliisque Trichodii non raro fere in longitudinem valvulæ inferioris protractam esse, plurimæ observationes nos edocuerunt. Tertiam denique; (*γ*) *aequalvem* dicendam, reapse, qualis pro se exstat, speciem propriam sistere quis non dixerit? Huic enim, præterquam quod culmum cum foliis robustiorem et paniculæ radios glumasque prorsus laeves habeat, perianthium est in floribus genuina *canina* fere duplo majoribus æqualve, glumas æquans et muticum."

The type specimen collected at Sitka by Doctor Mertens in 1829 is in the Trinius herbarium. (Pl. XXXVI, fig. 2.) A portion is deposited in the

National Herbarium, as is also a portion of Mertens's specimen from Unalaska. (Pl. XXXVI, fig. 1.) I have selected the Sitka specimen as the type, because this locality is first mentioned under *A. aenea* below. No specimen or locality is mentioned by Bongard.

*A. aenea* Trin., Mem. Acad. St. Petersburg, Ser. VI, 6<sup>o</sup>: 332. 1841. (Agrostidea II: 86). "Sitka, Unalashka." Trinius refers to this the Alaskan forms that he had previously included under *A. canina aenea*, and *melaleuca* in Bongard, l. c.

*A. exarata aenea* Griseb., in Ledeb. Fl. Ross. 4: 441. 1853. "Hab. in insulis Unalashka (Trin.) et Sitchka! (Bong.)" Variety *melaleuca* is included here by Grisebach.

*A. canina melaleuca* Trin. Mem. Acad. St. Petersburg, Ser. VI, 2: 170. 1832.

The original description of this is given above in full. I have been unable to find the type specimen. From the description we see that Trinius includes two forms, the first of which has the perianth (flowering glume) a little shorter than the glumes, the superior valve (palea) very small, and has the inferior valve (flowering glume) bearing a scarcely exerted awn a little above the middle.

The second form would, from the description, belong to *A. aquivalvis*, but the name *melaleuca* should rest upon the first form, which applies to *A. aenea*. It is to be noted that Trinius himself revises his disposition of these forms when he raises *A. canina aenea* to specific rank (Agrostidea II: 86), for, allowing his diagnosis of the species, he says "*Agrostis canina, aenea et melaleuca* (utraque partim) Trin. in Bongard. Flora Sitchensis in Act. Petropol. 1832, p. 170." It is for these reasons that I have taken up *melaleuca* for the untenable name *aenea*.

Differs from *A. borealis* in having the panicle oblong rather than pyramidal, and in having the awn straight and included or slightly exerted rather than exerted and geniculate. The culms are usually tall (30-50 cm.) and more leafy than in *A. borealis*. The latter is sometimes as tall, but then has proportionately larger and more diffuse panicle. The culms of *A. melaleuca* occur as isolated plants rather than tufted, and the spikelets are copper-colored. The characteristic habitat of this species is sphagnum swamps.

DISTRIBUTION: ALASKA. Kadiak Island, *Georgeson* 2, 3, *Coville and Kearney* 2348; Sitka, *Evans* 254, *Wright* 1579; Unalaska, *Kellogg* 119; Nagai Island, *Harrington*; Attu Island, *Geol. Surv. Can.* 32, 126; *Piper*, Yakutat, 4628, 4630, Sitka 4629, *Seldovia* 4627, and *Ankow* 4626. BRITISH COLUMBIA: *Rogers Pass*, *Selkirk Mountains*, 7,000 feet, *Geol. Surv. Can.* 5. COLORADO: *Silver Plume*, *Rydberg* 2425; *Mount Massive*, 12,000 feet, *Holm*, August, 1899.

This includes most of the material that has been referred to *A. canina* and *A. rubra*. It may be that the two Alaska specimens included under *A. borealis* should go here.

## 26. *A. borealis* Hartm.

*A. rubra* L., Sp. Pl. 62. 1753. This name has been commonly used for our plant, but since the Linnean plant can not be identified it seems best to take up the next name which can be definitely connected with the species here considered. My reasons for this course are given in detail in another place (*Bot. Gaz.* 38: 141. 1904). Briefly, they are these: There is no type specimen; the plant in Linneus's herbarium labeled *A. rubra* is *Sporobolus*, and there is evidently an error. The description is insufficient and incorrect, in so far as the awn is described as terminal, while *A. canina* is said to have a dorsal awn. The citations or references to plates are based upon *Gastridium australe*. While it is true that later authors have fixed the name *A. rubra* to a definite plant, it seems best for the sake of stability to discard the name *A. rubra* L.

*A. borealis* Hartm., Scand. Fl., Ed. III, 17. 1838. Mr. C. H. Ostenfeld of the Copenhagen Botanical Museum, has transcribed and translated Hartmann's description for me, as follows: "Panicle pyramidal, with few-flowered, somewhat scabrous branches; awn as in the foregoing (*A. canina*); basal leaves narrower.

"Mountains in wet places (Lapland). Resembles the foregoing (*A. canina*) with regard to the flower, the following (*A. vulgaris*) with regard to the appearance in general."



*A. mertensii* Trin., Mem. Acad. St. Petersburg. Ser. VI. 6<sup>2</sup>: 331. 1841. (Agrostidea II: 85). "Unalaska (Mertens.—foliis flaccidioribus et mollioribus)." *A. laxiflora mertensii* Griseb., in Ledeb. Fl. Ross. 4: 442. 1853. "Hab. in insula Unalaska (Mertens ap Trin.)." The type specimen of *A. mertensii* is in the Trinius herbarium. A portion of this is deposited in the National Herbarium. It was collected in Unalaska by Doctor Mertens in 1829. (Pl. XXXV, fig. 1.) It differs from the Flett (1689) and the Wright (1584) specimens in having more acuminate empty glumes. The Piper (4617, 4618) specimens agree well with the type, but are more robust. It seems, however, scarcely worthy of specific or even subspecific rank. *A. inconspicuum* Kunze is mentioned under this as a synonym by Trinius.

*A. canina alpina* Oakes, Cat. Pl. Ver. 32. 1842. "*A. rupestris* Gray in Sill. Jour., vol. 42. On the summit of Camel's Hump Mountain, Robbins, Tuckerman, and Macrae, July. This variety is common on the White Mountains and is connected with the common variety, which is abundant in Essex County, Mass., by several intermediate forms found at the base and on the sides of the White Mountains." *A. rupestris* Gray is a nomen nudum, as Gray in the article referred to only mentions finding *Agrostis rupestris* on Roan Mountain. (Notes of a Botanical Excursion to the Mountains of North Carolina, etc., p. 42.) I have examined the specimen of Oakes in the Gray herbarium, which is probably a duplicate, and also the specimen collected by Gray on Roan Mountain, upon which is based *A. rupestris* of Chapman's Flora, etc.

*A. canina* var.? *tenella* Torr., Fl. N. Y. 2: 443. 1843. "Mountains in the northern part of the State. This grass differs from *A. canina* in its less diffuse panicle, narrow glumes, and flat leaves, and yet I know of no other species to which it is more nearly allied."

*A. pickeringii* Tuckerm., Hovey's Mag. Hort. 9: 143. April, 1843. Also Am. Journ. Sci. 45: 42. 1843, probably later than the above, as the signature title reads "Apr.—June." In the first article the description is in English. In the second is given the equivalent in Latin, but there is added a variety *rupicola* with smaller contracted panicle and purplish white flowers from White Mountains, Pickering and Oakes, and from Camel's Hump, Vermont. *A. canina* var. *alpina* Oakes is given as a synonym of the variety. In the first the locality is "White Mountains;" the second, "White Mountains, Great Haystack." The type specimen is in the Gray herbarium.

*A. concinna* Tuckerm., l. c., published in both articles as above. From the first we have "Hab. White Mountains. Quite distinct from *A. alpina*, *A. rupestris*, and *A. canina*." From the second article, "Hab. White Mountains, stony alpine moor on Mount Monroe, with *Carex scirpoidea* and *Potentilla minima*. Somewhat resembling *A. alpina* in habit, but that is remarkable for the two bristles at the top of the inferior palea, and the awn at its base. It is quite different from *A. rupestris* and *A. canina*." The type specimen is in the Gray herbarium. It is possible that Tuckerman's specimens in the Gray herbarium should be considered as duplicate types.

*A. rubra americana* Scribn., in Macoun Cat. Pl. Can. 2: 391. 1890. "It is the same as *A. rupestris* Chapm. (non All.), found on Roan Mountain, North Carolina. The same plant grows on the White Mountains of New Hampshire (*A. canina* var. *alpina* Oakes), together with the true *A. rupestris* All." Macoun's specimens are from Mount Albert, Quebec.

*A. nova-angliae* Vasey, Contr. U. S. Natl. Herb. 3: 76. 1892. Not *A. nova-angliae* Tuckerm. Vasey cites *A. scabra* var. *montana* Tuckerm. as a synonym, but the description and the plants in the National Herbarium which Vasey studied and marked are *A. borealis*. I take as the type of this a specimen collected by C. G. Pringle in 1877 on Mount Washington, New Hampshire.

*A. paludosa* Scribn., U. S. Dept. Agr., Div. Agros., Bul. 11: 49. 1898. "Blanc Sablon, Labrador (Rev. A. Waghorne, September 25, 1893)." The type specimen is in the National Herbarium. This belongs to the group of dwarf forms which are intermediate between *A. hiemalis* and *A. borealis*. The type specimen resembles Macoun's No. 57, from Anticosti Island. It has the floret as long as the outer glumes and no palea. A specimen from Unalaska resembles this, but has the glumes abnormally elongated (Everman 129). I have placed this form with *A. borealis* until more material can be examined. It appears to differ only in the absence of the awn. Its apparent rarity is an indication that it may be only an awnless form of *A. borealis*.

Culms tufted, 20–40 cm. tall, or, in alpine or high northern plants, dwarf. Leaves tufted at base, few on culm; blades narrow and mostly upright, 1–2 or



sometimes 3 mm. wide, 5-10 cm. long. Panicle pyramidal, 5-15 cm. long; the lower branches whorled and spreading, upper ascending or contracted, slightly scabrous or nearly smooth. Empty glumes usually purple, equal, 2.5-3 mm. long, acute, very minutely scabrous on keel toward tip; flowering glume a little shorter than the empty glumes, awn usually bent and exerted 1-3 mm. beyond the spikelet, attached about the middle of the back; in some forms the awn is shorter or even obsolete; palet none or minute. (Pl. XXXIV, fig. 1, and Pl. XXXV, fig. 2.)

DISTRIBUTION: Alaska to Labrador, and the mountains of New York and New England; also mountains of North Carolina. ALASKA: Unalaska, *Mertens* in 1829, *Piper* 4618; Kadiak, *Piper* 4617; Sitka, *Wright* 1584; Nome City, *Flett* 1689. LABRADOR: Ungava Bay, *Geol. Surv. Can.* 12981; St. Nicholls, *Waghorne* 23a; Cartridge Bight, *Waghorne* in 1891. QUEBEC: Mount Albert, *Macoun* 22, 24. NEWFOUNDLAND: *Waghorne* in 1892; Battle Harbor, *Waghorne* in 1891; Grand Lake, *Waghorne* 10. MAINE: Mount Bigelow, *Fernald and Strong* 487; Mount Katahdin, *Briggs* 32, 536. *Fernald*, July, 1900. NEW HAMPSHIRE: White Mountains, *Oakes, Pringle, Chickering, Churchill, Hitchcock, Faron*, 4, 5, 6, 19, 20, 21, 22. VERMONT: Camel's Hump, *Pringle*; Mount Mansfield, *Eggleston*. NORTH CAROLINA: Roan Mountain, *Scribner, Vasey, Chickering*. A dwarf form which I have referred here is represented by: LABRADOR, *Allen* 22 (Pl. XXXIV, fig. 2), *Waghorne*; NEWFOUNDLAND, *Waghorne*.

Two specimens collected at Cartwright, Labrador, by *Waghorne* (34, 38) are doubtful. They differ from *A. borealis* in the leafy stem and short straight awn, and from *A. melaleuca* in the tufted habit.

*A. borealis* differs from the dwarf form of *A. hiemalis geminata* in the less scabrous branches of the panicle.

#### 27. *A. longiligula* sp. nov.



FIG. 2.—*Agrostis paludosa* Scribn.: a, empty glumes; b, flowering glume, showing a small palet and three stamens.

Culms erect, tall, 70 cm in height. Leaves several; blades 10-15 cm. long, 3-4 mm. wide, scabrous; ligule elongated and decurrent, 5-6 mm. long. Panicle bronze-purple, 10-18 cm. long, rather densely flowered; branches very scabrous. Empty glumes acute, scabrous on the keel and minutely hispidulous on the back, lower nearly 4 mm. long, upper about 3.5 mm.; flowering glume about 2.5 mm. long, the upper portions of the nerves minutely scabrous, awned; awn rising from the middle of the back, exerted, 2-2.5 mm. long, bent at the middle; callus hairs very short; palet minute, about .2 mm. long.

The type specimen in the National Herbarium was collected near Fort Bragg, Mendocino County, Cal., in water of a meadow, by Davy and Blasdale (No. 6110), in 1899. (Pl. XXXVI, fig. 3.) The same collectors found it in other localities in this county (Nos. 6088, 6095, 6096, 6105, 6106, 6107, 6131, 6140). There is also a specimen without locality collected in California by Bolander in 1866 (No. 6472).

This species is allied to *A. borealis*, but differs in the more scabrous branches of the panicle, in the oblong panicle, and in the long ligule.

Davy and Blasdale 6131, collected in dense brush, is tall, but very slender, and with numerous lax leaves and a diffuse green panicle. The ligules are conspicuously elongated (8 mm.).

## SPECIES EXCLUDED.

The following list has been prepared by Mr. P. L. Ricker. Mr. E. D. Merrill has examined the grasses of Muhlenberg in the herbarium of the Philadelphia Academy of Natural Sciences (see U. S. Dept. Agr., Div. Agros., Circ. 27) and of Elliott in the herbarium of the College of Charleston (see Circ. 29, l. c.) and has recorded, in manuscript, notes upon the synonymy of other species. These synonyms, however, have not been given critical study and are here given only as a matter of convenience in tracing the various species of our North American flora which may have been assigned at one time or another to *Agrostis*, but are excluded in the present limitation of the genus.

- A. affinis* Schult., Mant. 2: 195. 1824. Based on *Agrostis* No. 17, Muhl. Descr. 75. 1817=*Sporobolus*? *affinis* (Schult.) Kunth.
- A. airoides* Torr., Ann. Lyc. N. Y. 1: 151. 1824=*Sporobolus airoides* (Torr.) Torr.
- A. aspera* Michx., Fl. Bor. Am. 1: 52. 1803=*Sporobolus asper* (Michx.) Kunth.
- A. australis* L., Mant. Pl. 1: 30. 1767=*Gastridium lendigerum* (L.) Gaud. (*G. australe* (L.) Beauv.)
- A. barbata* Buckl. ex A. Gray, Proc. Acad. Nat. Sci. Phila. 1862: 334. 1863=*Muhlenbergia texana* Buckl. fide Merrill mss.
- A. barbata* Pers., Syn. 1: 75. 1805=*Sporobolus asper* (Michx.) Kunth fide Spreng. sub *Agrostis aspera* Michx.
- A. brevifolia* Nutt., Gen. 1: 44. 1818=*Sporobolus brevifolius* (Nutt.) Scribn.
- A. cæspitosa* Torr., Ann. Lyc. N. Y. 1: 152. 1824=*Muhlenbergia sylvatica* Torr.?
- A. cinna* Lam. ex Pursh, Fl. Am. Sept. 1: 64. 1814=*Cinna arundinacea* Walt.!
- A. clandestina* Spreng. ex Muhl., Descr. 73. 1817=*Sporobolus asper* (Michx.) Kunth fide Merrill mss.
- A. composita* Poir. ex Lam., Encycl. Suppl. 1: 254. 1810=*Sporobolus compositus* (Poir.) Merrill.
- A. compressa* Torr., Cat. Pl. N. Y. 91. 1819 not Poir. 1810=*Sporobolus torreyanus* (R. & S.) Nash, fide Britt. Man. 107.
- A. compressa* Poir. ex Lam., Encycl. Suppl. 1: 258. 1810=*Sporobolus asper* (Michx.) Kunth fide Merrill mss. ex descr.
- A. cryptandra* Torr., Ann. Lyc. N. Y. 1: 151. 1824=*Sporobolus cryptandrus* (Torr.) A. Gray.
- A. debilis* (H. B. K.) Spreng., Syst. 1: 262. 1825=*Muhlenbergia debilis* (H. B. K.) Trin.
- A. diffusa* Muhl., Descr. 46. 1817 not Host. =*Muhlenbergia sylvatica* Torr. fide Merrill mss.
- A. domingensis* Schult., Mant. 3: 570. 1827=*Sporobolus domingensis* (Schult.) Kunth.
- A. erecta* (Schreb.) Spreng., Syst. 1: 264. 1825=*Brachyelytrum erectum* (Schreb.) Beauv.
- A. festucoides* Muhl. ex R. & S., Syst. 1: 326. 1817 as syn. =*Muhlenbergia racemosa* (Michx.) B. S. P. fide Merrill mss.

- A. filiformis* Willd., Enum. 95. 1809=*Muhlenbergia mexicana* (L.) Trin. fide Ind. Kew.
- A. ? glauca* Muhl. Descr. 76. 1817=*Calamagrostis cinnoides* (Muhl.) Barton fide Merrill mss.
- A. gracilis* Willd. ex Trin., in Mem. Acad. St. Petersb. VI. 6<sup>2</sup>: 302. 1841 as syn.=*Muhlenbergia gracilis* (H. B. K.) Trin.
- A. grænländica* Steud., Syn. Pl. Glum. 1: 175. 1854. Apparently not an Agrostis.
- A. indica* L., Sp. Pl. 63. 1753=*Sporobolus indicus* (L.) R. Br.
- A. involuta* Muhl., Descr. 72. 1817=*Sporobolus compositus* (Poir.) Merrill fide Merrill mss.
- A. juncea* Michx., Fl. Bor. Am. 1: 52. 1803=*Sporobolus junceus* (Michx.) Kunth.
- A. lateriflora* Michx., Fl. Bor. Am. 1: 53. 1803=*Muhlenbergia mexicana* (L.) Trin. fide Ind. Kew.
- A. latifolia* Trev., Besch. Bot. Gart. Bresl. 82. 1830=*Cinna latifolia* (Trev.) Griseb.
- A. lendigera* DC.=*Gastridium lendigerum* (L.) Gaud.
- A. littoralis* Lam., Tab. Encyc. 1: 161. 1791=*Sporobolus asper* (Michx.) Kunth fide Spreng. sub Agrostis.
- A. littoralis* With., Bot. Arr. Brit. Pl. 23. 1776=*Polypogon littoralis* (With.) J. E. Smith.
- A. longifolia* Torr., Fl. U. S. 1: 90. 1824=*Sporobolus compositus* (Poir.) Merrill fide Merrill mss.
- A. matrella* L., Mant. 185. 1771=*Osterdamia matrella* (L.) Kuntze.
- A. mexicana* L., Mant. 31=*Muhlenbergia mexicana* (L.) Trin.
- A. mexicana* Pers., Syn. 1: 76. 1805=*Calamagrostis canadensis* L.?
- A. microsperma* Lag., Gen. et Sp. Pl. 2. 1816=*Muhlenbergia debilis* Trin.
- A. miliacea* L., Sp. Pl. 61. 1753=*Oryzopsis miliacea* (L.) Richt.
- A. minutissima* Steud., Syn. Pl. Glum. 1: 171. 1854=*Sporobolus ramulosus* Kunth.
- A. nutans* Poir. ex Lam., Encyc. Suppl. 1: 255. 1810=*Panicum anceps* Michx.?
- A. oligantha* R. & S., Syst. 2: 372. 1817=*Muhlenbergia tenuiflora* fide Merrill mss.
- A. paradoxa* L., Sp. Pl. 62. 1753=*Oryzopsis paradoxa* (L.) Nutt.
- A. paradoxa* R. Br. in Ross. Voy. Ed. II 2: 192. 1819 nom. nud.=*Arctagrostis latifolia* (R. Br.) Griseb. fide Ind. Kew.
- A. pauciflora* Pursh, Fl. Am. Sept. 2: 63. 1814=*Muhlenbergia tenuiflora pauciflora* (Pursh) Scribn.
- A. polystachya* Bosc. ex Lam., Encycl. Suppl. 1: 254. 1810, as syn.=*Sporobolus compositus* (Poir.) Merrill.
- A. punctata* (L.) Lam. Encycl. 1: 58. 1783=*Eriochloa punctata* (L.) W. Hamilt.
- A. pungens* Pursh, Fl. Am. Sept. 1: 64. 1814=*Sporobolus pungens* (Pursh) Kunth.=*S. virginicus* (L.) Kunth fide Hook. Fl. Brit. Ind. 7: 249. 1896.
- A. racemosa* Michx., Fl. Bor. Am. 1: 53. 1803=*Muhlenbergia racemosa* (Michx.) B. S. P.
- A. ramosa* Poir., in Lam. Encycl. Suppl. 1: 257. 1810=*Eriochloa annulata* (Flugge) Kunth fide Ind. Kew.
- A. rubicunda* Bosc. in DC. Hort. Monsp. 151. 1813, as syn.=*Muhlenbergia expansa* (Poir.) Trin.
- A. sericea* Muhl., Descr. 64. 1817=*Muhlenbergia capillaris* (Lam.) Trin. fide Merrill.
- A. serotina* Torr., Fl. U. S. 1: 88. 1824=*Sporobolus uniflorus* (Muhl.) Scrib. & Merrill fide Merrill mss.
- A. setosa* Spreng., Syst. 1: 262. 1825=*Muhlenbergia debilis* Trin. fide Merrill mss.

- A. setosa* Muhl., Descr. 68. 1817=*Muhlenbergia racemosa* (Michx.) B. S. P. fide Merrill mss.
- A. sobolifera* Muhl., in Willd. Enum. 95. 1809=*Muhlenbergia sobolifera* (Muhl.) Trin.
- A. spica-venti* L., Sp. Pl. 61. 1753=*Apera spica-venti* (L.) Beauv.
- A. suaveolens* Blytt, Mag. Naturv., 1837=*Cinna latifolia* (Trev.) Griseb. fide Ind. Kew.
- A. sylvatica* Torr., Fl. U. S. 87. 1824 not L. 1762=*Muhlenbergia sylvatica* (Torr.) Torr.
- A. tenuiflora* Willd., Sp. Pl. 1: 364. 1797=*Muhlenbergia tenuiflora* (Willd.) B. S. P.
- A. tenuiflora* Ell., Sk. 1: 134. 1816=*Muhlenbergia diffusa* Schreb. fide Merrill.
- A. thyrsoides* Bosc, in Mem. Acad. St. Petersb. Ser. VI. 6<sup>2</sup>: 76. 1840, as syn. of *Vilfa fulvescens* Trin.
- A. torreyana* Schult., Mant. 2: 263. 1824=*Sporobolus torreyanus* (R. & S.) Nash.
- A. trichantha* Schrank, Regensb. Denksch., 2: 5, ex Steud., Syn. Pl. Glum. 1: 175. 1854. Apparently not an *Agrostis*.
- A. trichopodes* Ell., Sk. 1: 135. 1817=*Muhlenbergia expansa* Trin. fide Merrill.
- A. vaginiflora* Torr., in Gray Man. 576=*Sporobolus vaginiflorus* (Torr.) Wood.
- A. virginica* L. Sp. Pl. 63. 1753=*Sporobolus virginicus* (L.) Kunth.
- A. virginica* Muhl., Descr. 74. 1817=*Sporobolus vaginiflorus* (Torr.) Wood fide Merrill mss.

#### NOTES ON MEXICAN SPECIES.

Fournier has described several species of *Agrostis*, but unfortunately I have not been able thus far to identify all of these satisfactorily. It is quite possible that many of his new species will later be reduced to synonymy. Below I give transcripts of the original descriptions of Fournier's species, as published in his *Mexicanas Plantas, Gramineæ*, 1881.

*A. toluensis* H. B. K., Nov. Gen. 1: 135. 1815.

I have not seen the type specimen of this, but we have Liebmann's No. 701 from Orizaba, which is one of the specimens cited by Fournier. I take Pringle's No. 4219, from the State of Mexico, Mexico, to be this species. (Pl. XXXVII.) A specimen from Costa Rica (Pittier 3373) also agrees with this. Pringle No. 5202, from the State of Mexico, Mexico, is a dwarf form. All agree in having the awn attached below the middle of the glume.

*A. virescens* H. B. K., l. c.

The type specimen is in the herbarium of the Museum of Paris. (Pl. XXXVII, B.) This has a looser panicle and the awn is attached above the middle of the flowering glume. It may be a form of *A. toluensis* H. B. K.

"*A. schaffneri* Fourn., l. c., 94.

"Culmo glabro, 2-3 pedali; vaginis laxis, foliis planis latis mollibus, ligula longa fissa; folio ultimo paniculam longe invaginate, etiam superante: panícula longa composita, fere pedali, nitide virenti, radiis erecto-appressis basi nudis; spiculis angustis glabris; glumis nitidis florem superantibus, secus carinam scabris, inferiore longiore acuta; palea inferiore integra, involuta, arista gracili recta e medio orta florem superante; palea superiore deficiente. antheris 3.

"Tacubaya (Schaffn. n. 86 et 308 in herb. Franq.).

"Var. *β. mutica*.

"Tacubaya (Schaffn. n. 1 in herb. Franq.)."



I have seen no specimen of this. From the description it may be *A. pallens foliosa*.

"*A. tacubayensis*, Fourn., l. c., 95.

"Culmo pedali; foliis planis, fasciculorum setaceis; panicula 4-pollicari, effusa, radiis solitariis longis inæqualibus circiter a medio floriferis; glumis violaceis inæqualibus, flosculo fere dimidio brevior quam gluma inferior.

"Pr. Tacubaya, julio (Schaffn. n. 91)."

I have seen no specimens. It may be some form of *A. hiemalis*.

"*A. bourgvi* Fourn., l. c., 95.

"Culmo plus quam bipedali; foliis planis 3' longis, 2''' latis, ligula acuta laciniata bilineali, panicula acuta 3-4 pollicari, radiis hispidis brevibus remote verticillatis erecto-appressis a medio circiter floriferis, glumis atro-violaceis inæqualibus acutis in carina hispido-aculeatis, flosculo mutico paulo brevior quam gluma superior.

"Pedregal pr. Tizapan in valle Mexicensi, augusto (Bourg. n. 682)."

The type specimen is in the herbarium of the Museum of Paris. I should refer this to *A. schiedeana* Trin. as represented by Pringle 4485. There is a small palet. (Pl. XXXVII, D.)

"*A. virletii* Fourn., l. c., 96.

"Planta cæspitosa robusta, culmo valido, vaginis latis marcescentibus, foliis 3''' latis, planis, acutis, ligula longa amplexicauli laciniata; panicula 4-5 pollicari, invaginata, lucida, radiis erecto-appressis scabris a medio dense floriferis, ut maximum, sesquipollicaribus; glumis violaceis, scabris, acuminatis, inferiore præsertim, demum patentibus, flosculo mutico æquante glumam superiorem.

"Var.  $\alpha$ —Palea superiore  $\frac{2}{3}$  inferioris æquante.

"San Luis de Potosi (Viril. n. 1345).

"Var.  $\beta$ —Palea superiore  $\frac{1}{2}$  palee inferioris æquante.

"Cum typo.

"Var.  $\gamma$ —Palea superiore lata ovarium cingente et squamulas lineares æquante.

"Absque loco (Schaffn. in meo herbario); pr. Tacubaya (Schaffn. n. 307 in herb. Franq. junio); pr. Guazmalpan (Schaffn. n. 4 in herb. Franq.)."

The type specimen is in the herbarium of the Museum of Paris. The palet is about two-thirds the length of the flowering glume. (Pl. XXXVII, A.)

"*A. berlandieri* Fourn., l. c., 96.

"Culmo sesquipedali, glabro; foliis caulinis et fasciculorum planis lineam latis, subulatis, ligula hyalina fissa sesquilineali, panicula invaginata 3-4 pollicari, contractiuscula, radiis subverticillatis imis a basi, longioribus a medio floriferis; glumis lævibus inæqualibus, palea solitaria glumas æquante.

"Totoniho (Berl. n. 531).

"Obs.—Differt ab *A. pulchella* Kunth glumis lævibus non secus carinam aculeato-hispidis, palea glumas æquante."

"*A. chinantla* Fourn., l. c., 96.

"Culmo pedali v. plus quam pedali, simplici, foliis setaceis, infra fasciculatis, ligula amplexicauli prominente; panicula parva 3-4 pollicari, contractiuscula, radiis partim a basi, partim a medio floriferis; spiculis secus radios densis; glumis post anthesim late apertis, flosculo mutico solitario, paulo brevior quam gluma superior.

"Chinantla (Liebm. n. 709, maio)."

"*A. setifolia* Fourn., l. c., 97.

"Culmo sesquipedali, gracili; foliis involutis subulatis; ligula amplexicauli acuta laciniata; panicula brevi depauperata laxiflora, radiis flexuosis basi longe nudis; glumis æqualibus acutis; palea solitaria paulo brevior; arista basilari longa geniculata flosculum duplum superante.

"In monte Orizabensi, 10000' (Liebm. n. 712)."

There are two specimens in the National Herbarium—Sierra de San Felipe, Oaxaca, Pringle 4895; Smith 922.

"*A. ghiesbreghtii* Fourn., l. c., 97.

"Foliis plurimis radicalibus semipedalibus setaceis rigidis pungentibus sicut et culmeis paucis; vaginis longis; ligula obtusa; panicula decomposita ovali patente, ramis repetito-verticillatis; glumis subæqualibus in carina ciliolatis, flosculo solitario tertia parte brevior quam glumæ; arista e medio oriente recta, flosculum duplum æquante.

"Oajaca (Ghiesbreght)."

Type specimen in herbarium of Museum of Paris. It closely resembles Pringle's 4895 from Mexico, but the leaves are mostly basal rather than scattered along the stem. Fournier distinguishes this from *A. setifolia* Fourn. by the straight awn, but in the Paris specimen the awn is geniculate. This is probably only a form of *A. setifolia* Fourn.

*A. fasciculata* (H. B. K.) R. & S., Syst. 2: 362. 1817 (*Vilfa fasciculata* H. B. K., Nov. Gen. 1: 139. 1815), is reported from Mexico. The type specimen from Ecuador is in the Paris Museum. (Pl. XXXVII, C.)



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[Synonyms are printed in italics.]

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PLATES.

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## DESCRIPTION OF PLATES.

In all the plates the plants, panicles, or branches of panicles are drawn one-half natural size; the ligules are enlarged five times; the spikelets and florets are enlarged ten times.

PLATE I. Fig. 1.—*Agrostis thurberiana* Hitchc. Type specimen, Suksdorf 1021. Plant, ligule, spikelet, and two views of floret, showing prolonged rachilla and the palet. Fig. 2.—*Agrostis aequivalvis* Trin. Yes Bay, Alaska, Howell 1712. A.—Spikelet and floret, from type specimen in the Trinius herbarium, collected by Mertens.

PLATE II. *Agrostis alba* L. College Hill, Easton, Pa., T. C. Porter, July 2, 1897. Plant, ligule, spikelet, and two views of floret; rootstock and stolon from Macoun 26032 collected at Niagara Falls, Ontario, 1901.

PLATE III. Fig. 1.—*Agrostis alba vulgaris* (With.) Thurb. Apsey Beach, Newfoundland, Waghorne 23. Plant, ligule, spikelet, and two views of floret. Fig. 2.—*Agrostis alba aristata* Gray. Fort Preble, Maine, Gayle 786. Plant, ligule, spikelet, and two views of floret.

PLATE IV. *Agrostis alba maritima* (Lam.) Meyer. Nantucket, Mass., Hitchcock in 1902. Plant, ligule, spikelet, and two views of floret.

PLATE V. Fig. 1.—*Agrostis depressa* Vasey. Type specimen, Colorado, Patterson 46. Plant, ligule, spikelet, and two views of floret. Fig. 2.—*Agrostis stolonifera* L. Kerrville, Tex., Heller 1742. Plant, ligule, spikelet, floret, and dorsal view of flowering glume.

PLATE VI. *Agrostis depressa* Vasey. The Oregon form showing stolons, Astoria, Oreg., Leckenby in 1897. Plant, ligule, spikelet, and two views of floret.

PLATE VII. Fig. 1.—*Agrostis inflata* Scribn. Victoria, British Columbia, Macoun 259. Plant, ligule, spikelet, and two views of floret. A.—Spikelet and two views of floret from type specimen, Macoun 258. Fig. 2.—*Agrostis densiflora* Vasey. Type specimen, Santa Cruz, Cal., Anderson. Plant, ligule, spikelet, floret, and two flowering glumes. One flowering glume shows the mid-nerve vanishing about the middle and the other shows the mid-nerve extending into a thin awn.

PLATE VIII. Fig. 1.—*Agrostis humilis* Vasey. Type specimen, Mount Adams, Washington, Suksdorf. Plant, ligule, spikelet, and two views of floret. Fig. 2.—*Agrostis exigua* Thurb. Type specimen, California, Bolander. Plant, ligule, spikelet, and two views of floret.

PLATE IX. Fig. 1.—*Agrostis elliottiana* Schult. Collected by L. C. Johnson in Mississippi in 1886. Plant (the spikelets were unawned), ligule, spikelet, and two views of floret; an awned spikelet from Reverchon's No. 3391, Texas. Fig. 2.—*Agrostis canina* L. Delaware, Commons 99. Plant, ligule, spikelet, and two views of floret.

PLATE X. Fig. 1.—*Agrostis hallii californica* Vasey. Type specimen, Bolander 6103. Plant, ligule, spikelet, and two views of floret. Fig. 2.—*Agrostis hallii* Vasey. Type specimen, Oregon, Hall. Plant, ligule, spikelet, and two views of floret.

PLATE XI. *Agrostis davyi* Scribn. Type specimen, Davy and Blasdale 6062. Plant, ligule, spikelet, and two views of floret (in center). A.—Spikelet and two views of floret from type specimen of *Agrostis occidentalis* Scribn. & Merrill, Shear 1644.

PLATE XII. *Agrostis pringlei* Scribn. Type specimen, California, Pringle in 1882. Plant, ligule, spikelet, and two views of floret.

- PLATE XIII. Fig. 1.—*Agrostis pallens* Trin. Oregon, Howell in 1882. Plant, ligule, spikelet, and two views of floret. A.—Spikelet and two views of floret from type specimen in the Trinius herbarium. Fig. 2.—*Agrostis attenuata* Vasey. Type specimen, Howell 210. Plant, ligule, spikelet, and two views of floret.
- PLATE XIV. Fig. 1.—*Agrostis foliosa* Vasey. Type specimen, Oregon, Howell, in 1881. Plant, ligule, spikelet, and two views of floret. Fig. 2.—*Agrostis oregonensis* Vasey. Type specimen, Howell in 1881. Plant, ligule, spikelet, and two views of floret.
- PLATE XV. *Agrostis pallens foliosa* (Vasey) Hitchc. Mount Hood, Oregon, Henderson, 7. Plant, ligule, spikelet, and two views of floret. This is a form with open, oblong panicles resembling the type of *A. foliosa* Vasey, but with spikelets awned.
- PLATE XVI. Fig. 1.—*Agrostis pallens foliosa* (Vasey) Hitchc. Klickitat County, Wash., Suksdorf 199. Plant, ligule, spikelet, and two views of floret. A common form with narrow panicle. Fig. 2.—*Agrostis scouleri* Trin. Type specimen, Nutka Sound, Alaska, Scouler. Plant (from photograph), spikelet, and two views of floret. This is a portion of the type from the Trinius herbarium deposited in the National Herbarium.
- PLATE XVII. *Agrostis diegoensis* Vasey. Type specimen, San Diego, Cal., Orcutt in 1884. Plant, ligule, spikelet, and two views of floret.
- PLATE XVIII. *Agrostis breviculmis* Hitchc. Fort Bragg, Cal., Davy and Blasdale 6159. Plant, ligule, spikelet, and two views of floret.
- PLATE XIX. Fig. 1.—*Agrostis microphylla major* Vasey. Truckee valley, Nev., Watson 1284. Plant, ligule, spikelet, and two views of floret. Fig. 2.—*Agrostis microphylla* Steud. Mendocino County, Cal., Davy and Blasdale 5142. Plant, ligule, spikelet, and two views of floret. A.—Yamhill County, Oreg., Shear 1650. Panicle.
- PLATE XX. *Agrostis ampla* Hitchc. Multnomah County, Oreg., Suksdorf 135. Plant, ligule, spikelet, and two views of floret.
- PLATE XXI. Fig. 1.—*Agrostis exarata* Trin. Specimen from the Trinius herbarium deposited in National Herbarium; Unalaska, Kostalsky in 1829. Plant, ligule, spikelet, and two views of floret. Fig. 2.—*Agrostis asperifolia* Trin. Type specimen from the Trinius herbarium deposited in the National Herbarium. Plant, spikelet, and two views of floret.
- PLATE XXII. *Agrostis grandis* Trin. Sequoia region, Cal., Hansen 1826. Plant, ligule, spikelet, and two views of floret. A common large form of *A. exarata* which matches the type specimen in the Trinius herbarium. A.—Spikelet and two views of floret from type specimen in the Trinius herbarium from Columbia region, Hooker.
- PLATE XXIII. *Agrostis exarata* Trin. Amador County, Cal., Hansen 613. Plant, ligule, spikelet, and two views of floret. A common form with elongated, somewhat open panicle. A.—A panicle from plant collected at Reno, Nev., by Tracy, No. 218. A form with narrow, compact, and somewhat glomerate panicle.
- PLATE XXIV. Fig. 1.—*Agrostis rossae* Vasey. Type specimen, Yellowstone Park, Ross in 1890. Plant, ligule, spikelet, and two views of floret. Fig. 2.—Plant at left: *Agrostis varians* Trin. Type specimen from the Trinius herbarium deposited in National Herbarium. Plant, ligule, spikelet, and two views of floret. Plant at right: *A. variabilis* Rydb. Wyoming, Williams 2952½.
- PLATE XXV. *Agrostis howellii* Scribn. Type specimen, Hood River, Oreg., Howell in 1886. Plant, ligule, spikelet, and two views of floret.
- PLATE XXVI. Fig. 1.—*Agrostis hiemalis* (Walt.) B. S. P. Bush 554. Panicle, ligule, spikelet, and two views of floret. The common eastern form with very diffuse capillary panicle and small spikelets. In this plant the panicle is shown at maturity. Fig. 2.—A form with less diffuse panicle, common in the Rocky Mountain regions. Wyoming, Nelson 3947. Plant, spikelet, and two views of floret.

- PLATE XXVII. Types referred to *Agrostis hiemalis* (Walt.) B. S. P. 1.—*Trichodium album* Presl. From specimen in the Trinius herbarium sent by Presl in 1834. Branch of panicle, spikelet, and three views of floret. 2.—From specimen of *Agrostis clavata* Trin. in the Trinius herbarium, collected by Kostalsky in 1829. Branch of panicle, spikelet, and two views of floret. 3.—From type specimen of *Trichodium laxiflorum*, in Michaux herbarium in Museum of Paris. Branch of panicle, spikelet, and two views of floret. 4.—Dwarf form of *Agrostis hiemalis* from Newfoundland. Waghorne 25. Plant, ligule, spikelet, and two views of floret. 5.—Awned form of *Agrostis hiemalis*, White Mountains, Hitchcock in 1902. Branch of panicle, spikelet, and two views of floret.
- PLATE XXVIII. Fig. 1.—*Agrostis geminata* Trin. Type specimen from the Trinius herbarium, collected in Unalaska by Eschscholtz. Plant, ligule, spikelet and two views of floret. Fig. 2.—An awnless form, collected in Alaska by Flett (No. 2014). Plant, ligule, spikelet, and two views of floret.
- PLATE XXIX. Fig. 1.—*Agrostis idahoensis* Nash. Duplicate type, Heller 3431. Plant, ligule, spikelet, and two views of floret. Fig. 2.—*Agrostis tenuis* Vasey. Type specimen, San Bernardino Mountains, Cal., Parish brothers 1085. Plant, ligule, spikelet, and two views of floret.
- PLATE XXX. *Agrostis schiedeana* Trin. Falcon valley, Wash., Suksdorf in 1886. Plant, ligule, spikelet, and two views of floret. A.—Spikelet and two views of floret from Pringle No. 4485, collected in Mexico.
- PLATE XXXI. *Agrostis perennans* (Walt.) Tuckerm. Washington, D. C., Hitchcock in 1903. Plant, ligule, spikelet, and two views of floret. The common upright form of open ground. A.—*Agrostis schweinitzii* Trin., from type specimen in the Trinius herbarium. B.—*Alopecurus carolinianus* Spreng., from specimen in the Trinius herbarium from Peter, Lexington, Ky.
- PLATE XXXII. *Agrostis perennans aestivalis* Vasey. Athens, Ill., Hall in 1864. Type specimen. Plant, ligule, spikelet, and two views of floret. The weak decumbent form of moist, shady situations. A.—From type specimen of *Agrostis oreophila* Trin., in the Trinius herbarium, collected by Moser at Bethlehem, Pa. B.—From type specimen of *Trichodium decumbens* Michx., in Michaux herbarium in Museum of Paris.
- PLATE XXXIII. *Agrostis perennans elata* (Pursh) Hitchc. Egg Harbor, N. J., Vasey in 1884. Plant, ligule, spikelet, and two views of floret. A.—From type specimen of *Agrostis elata* Trin. in the Trinius herbarium. Spikelet and two views of floret.
- PLATE XXXIV. Fig. 1.—*Agrostis borealis* Hartm. Mount Washington, N. H., Faxon 19. The common form of the White Mountains. Plant, ligule, spikelet, and two views of floret. Fig. 2.—*Agrostis borealis* Hartm. Labrador, Allen 22. A common dwarf form. Plant, ligule, spikelet, and two views of floret.
- PLATE XXXV. Fig. 1.—*Agrostis mertensii* Trin. Type specimen. Unalaska, Mertens in 1825, from the Trinius herbarium. Plant, ligule, spikelet, and two views of floret. Fig. 2.—*Agrostis borealis* Hartm. Sweden; collected by Oldberg. Plant, ligule, spikelet, and two views of floret.
- PLATE XXXVI. Fig. 1.—*Agrostis acnea* Trin. Unalaska, Mertens in 1829. Plant. Fig. 2.—*Agrostis acnea* Trin. Type specimen, Sitka, Mertens in 1829. Plant, spikelet, and two views of floret. Fig. 3.—*Agrostis longiligula* Hitchc. Type specimen, Mendocino County, Cal., Davy and Blasdale 6110. Plant, ligule (with fig. 2), spikelet, and two views of floret.
- PLATE XXXVII. *Agrostis toluensis* H. B. K. State of Mexico, Mexico, Pringle 4219. Plant, ligule, spikelet, and two views of floret. A.—Spikelet and two views of floret from type specimen of *A. virletii* Fourn. B.—Spikelet and two views of floret from type specimen of *A. virescens* H. B. K. C.—Spikelet and two views of floret from type specimen of *Vilfa fasciculata* H. B. K., from Paris Museum. D.—Spikelet and two views of floret from type specimen of *A. bourgai* Fourn.

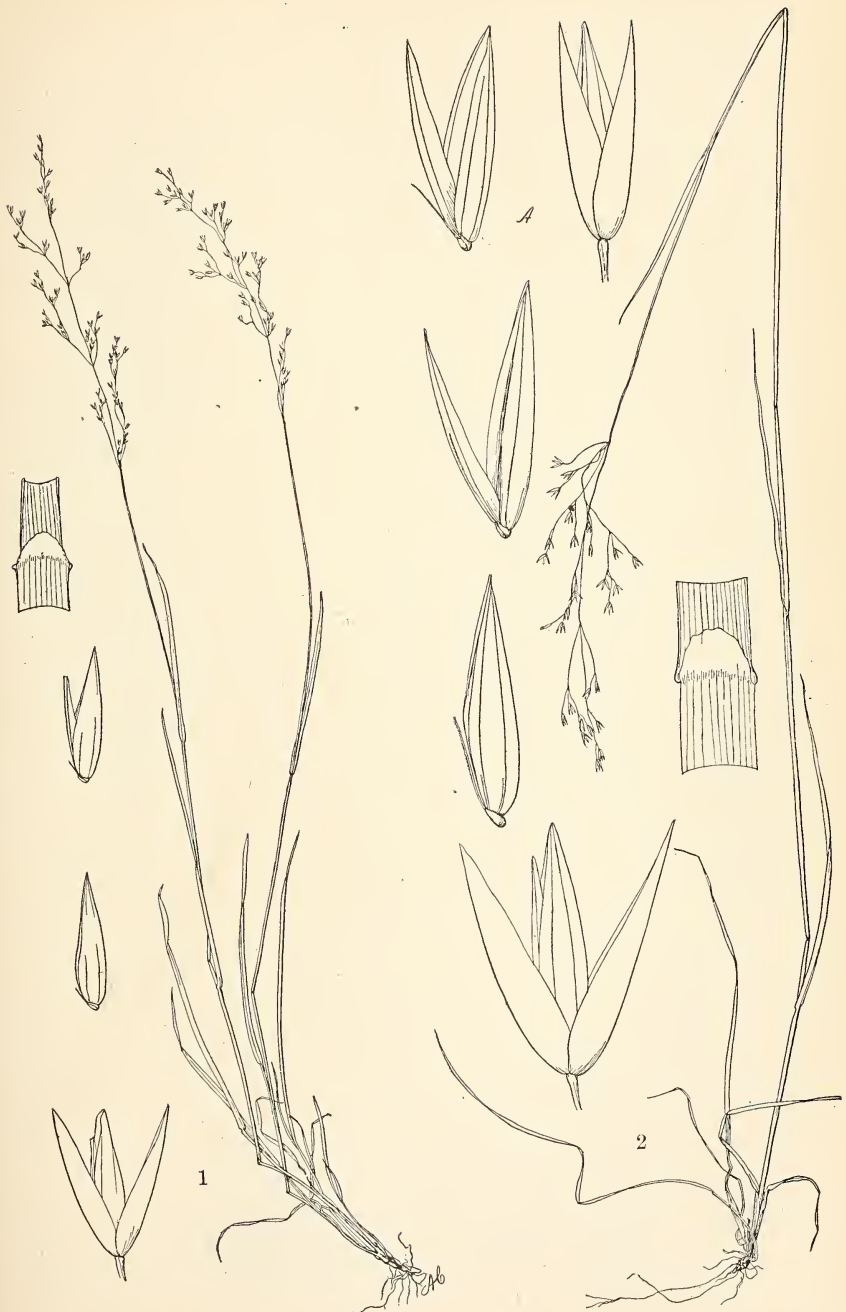
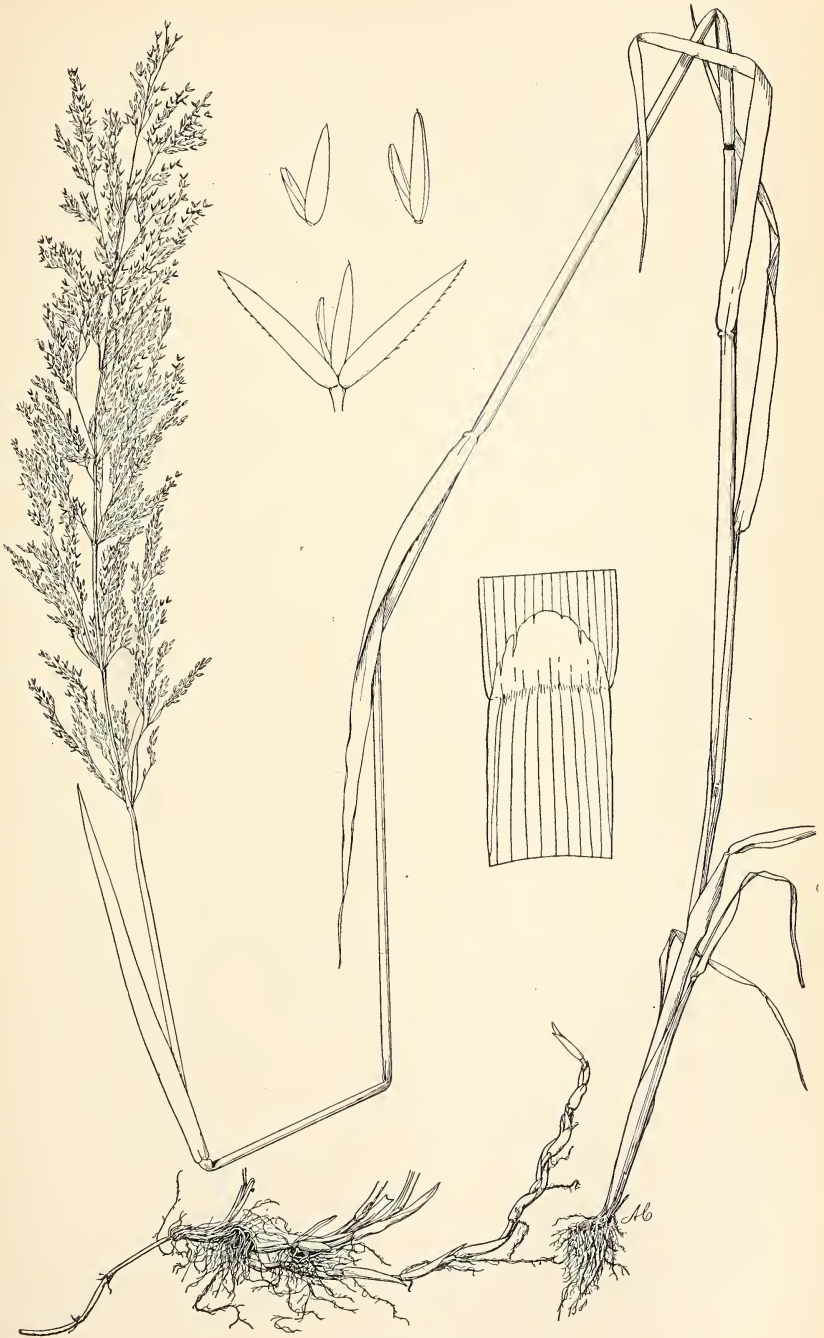


FIG. 1.—*AGROSTIS THURBERIANA* HITCHC. FIG. 2.—*AGROSTIS ÆQUALVIS* TRIN.







AGROSTIS ALBA L.





FIG. 1.—*AGROSTIS ALBA VULGARIS* (WITH.) THURB. FIG. 2.—*AGROSTIS ALBA ARISTATA* GRAY.







AGROSTIS ALBA MARITIMA (LAM.) MEYER.





FIG. 1.—*AGROSTIS DEPRESSA* VASEY (TYPE SPECIMEN). FIG. 2.—*AGROSTIS STOLONIFERA* L.







AGROSTIS DEPRESSA VASEY (OREGON).



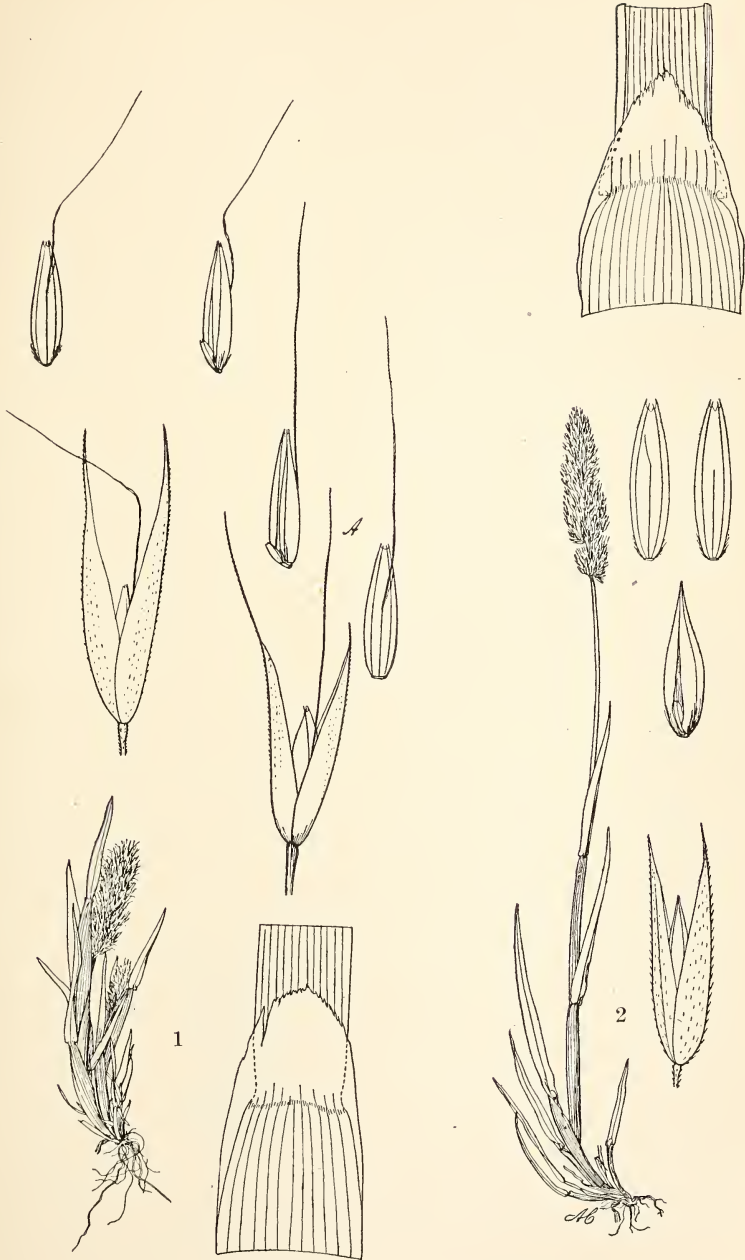


FIG. 1.—*AGROSTIS INFLATA* SCRIBN. FIG. 2.—*AGROSTIS DENSIFLORA* VASEY.







FIG. 1.—*AGROSTIS HUMILIS* VASEY. FIG. 2.—*AGROSTIS EXIGUA* THURB.



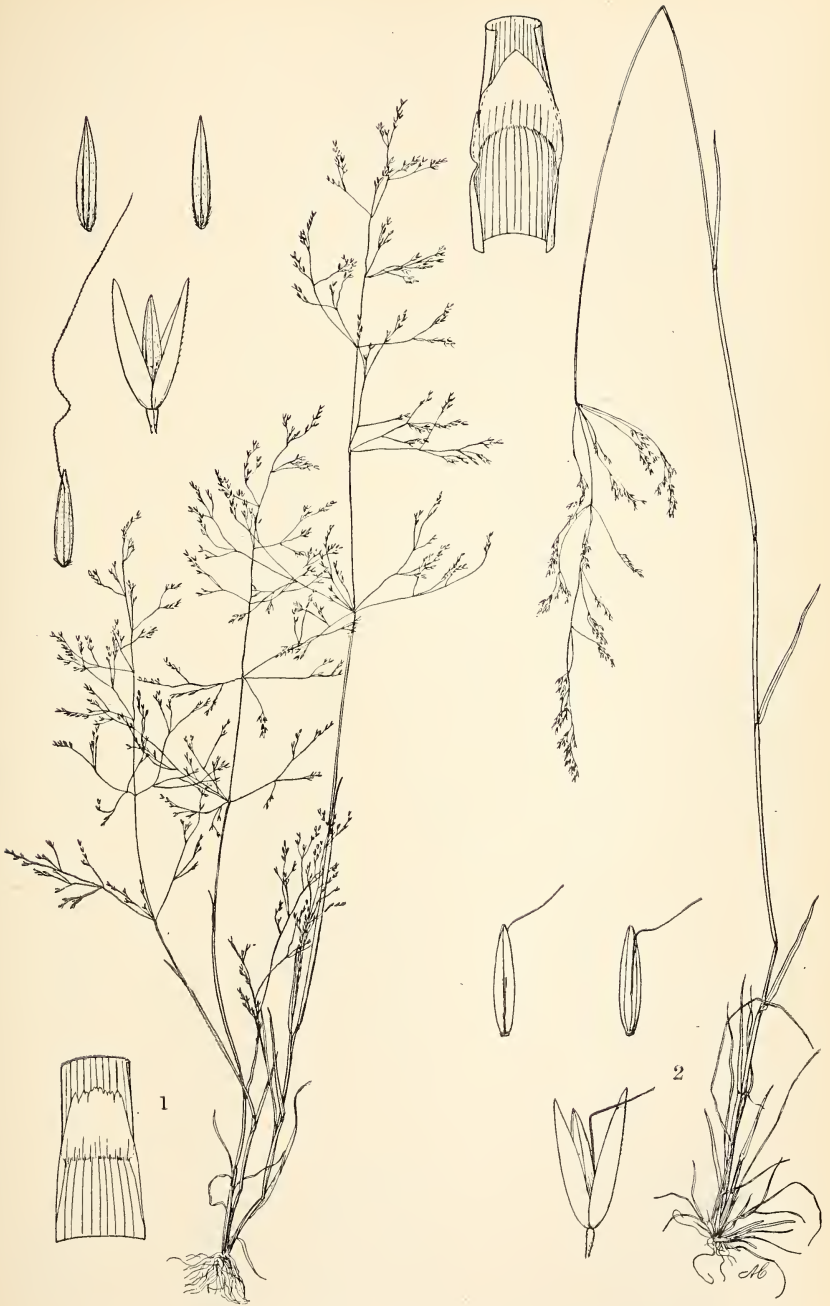


FIG. 1.—*AGROSTIS ELLIOTTIANA* SCHULT. FIG. 2.—*AGROSTIS CANINA* L.





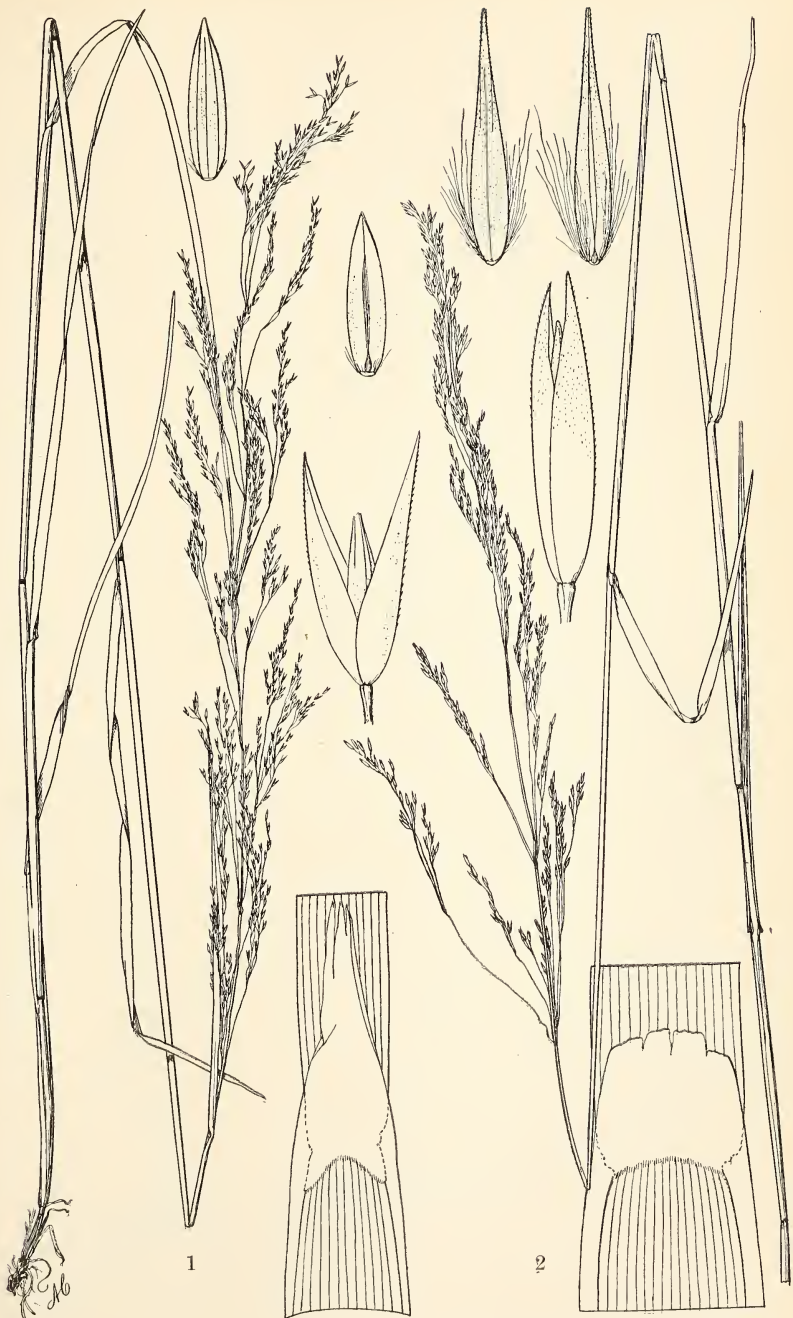


FIG. 1.—*AGROSTIS HALLII CALIFORNICA* VASEY. FIG. 2.—*AGROSTIS HALLII* VASEY.





AGROSTIS DAVYI SCRIBN. AND (A) SPIKELET OF *A. OCCIDENTALIS* SCRIBN. & MERRILL.







AGROSTIS PRINGLEI SCRIBN.





FIG. 1.—*AGROSTIS PALLENS* TRIN. FIG. 2.—*AGROSTIS ATTENUATA* VASEY.



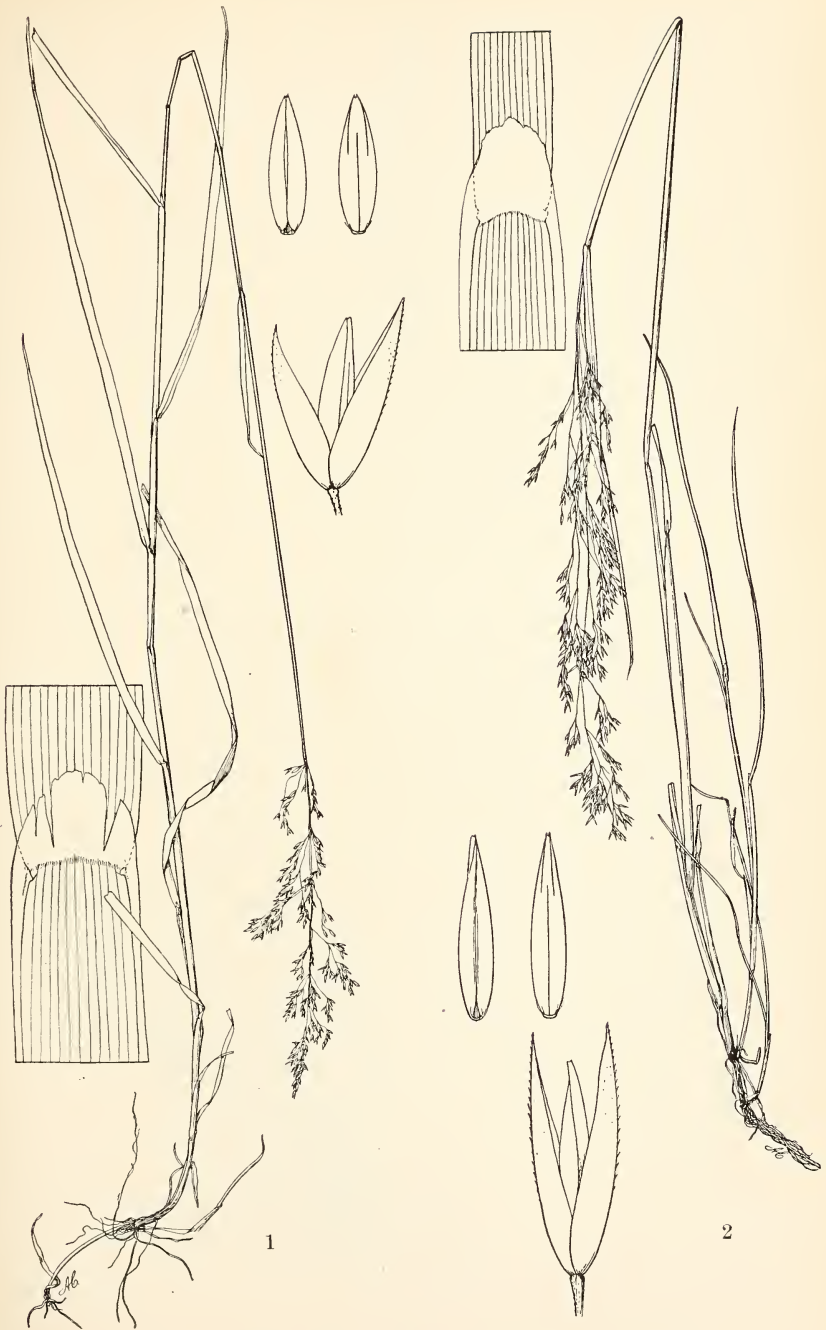
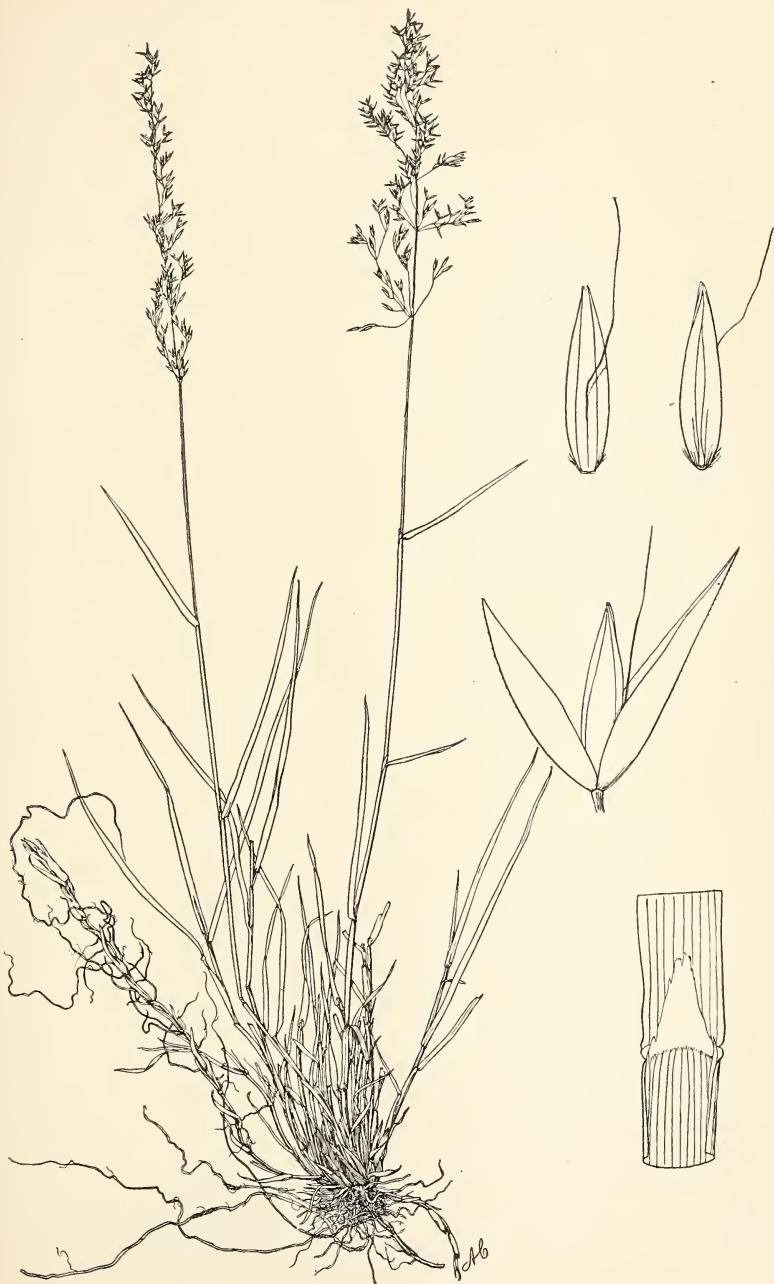


FIG. 1.—*AGROSTIS FOLIOSA* VASEY. FIG. 2.—*AGROSTIS OREGONENSIS* VASEY.







AGROSTIS PALLENS FOLIOSA (VASEY) HITCHC. (AWNED FORM).



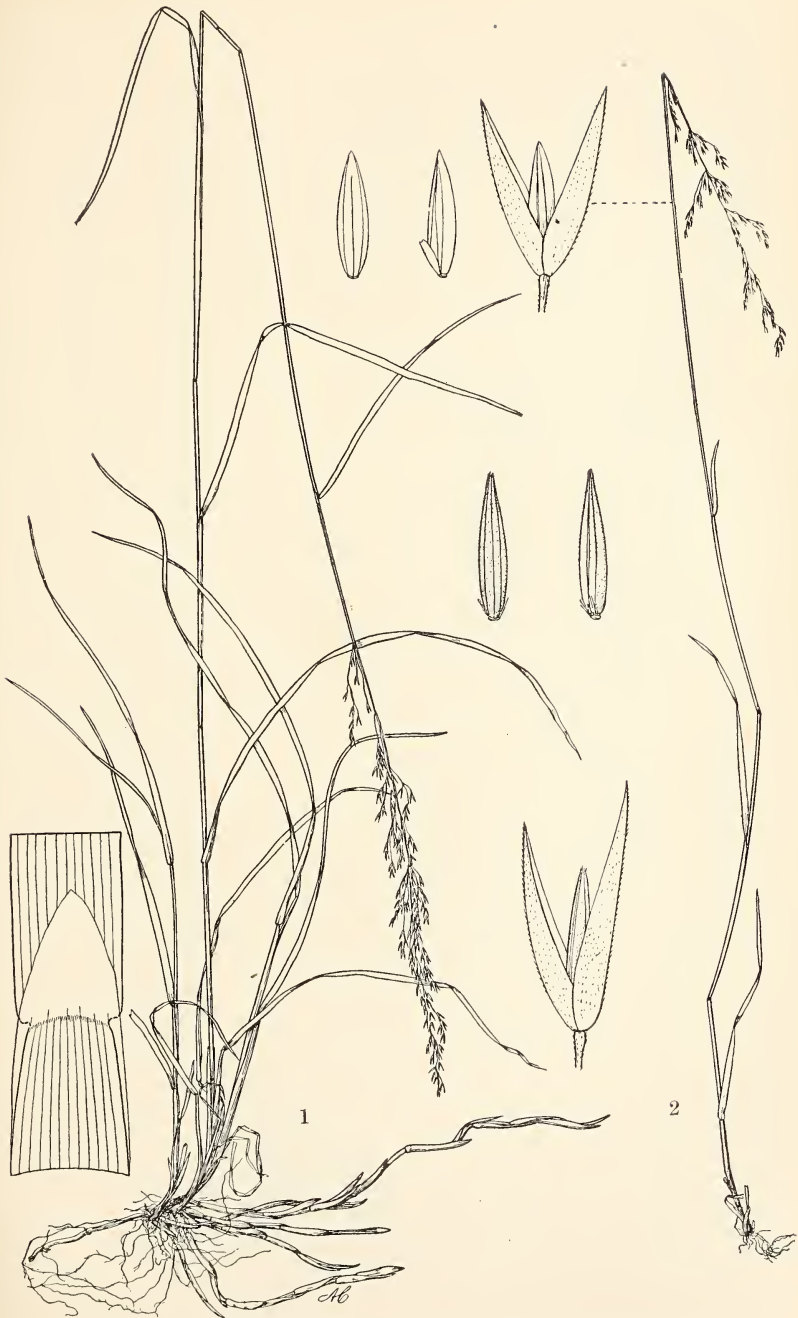
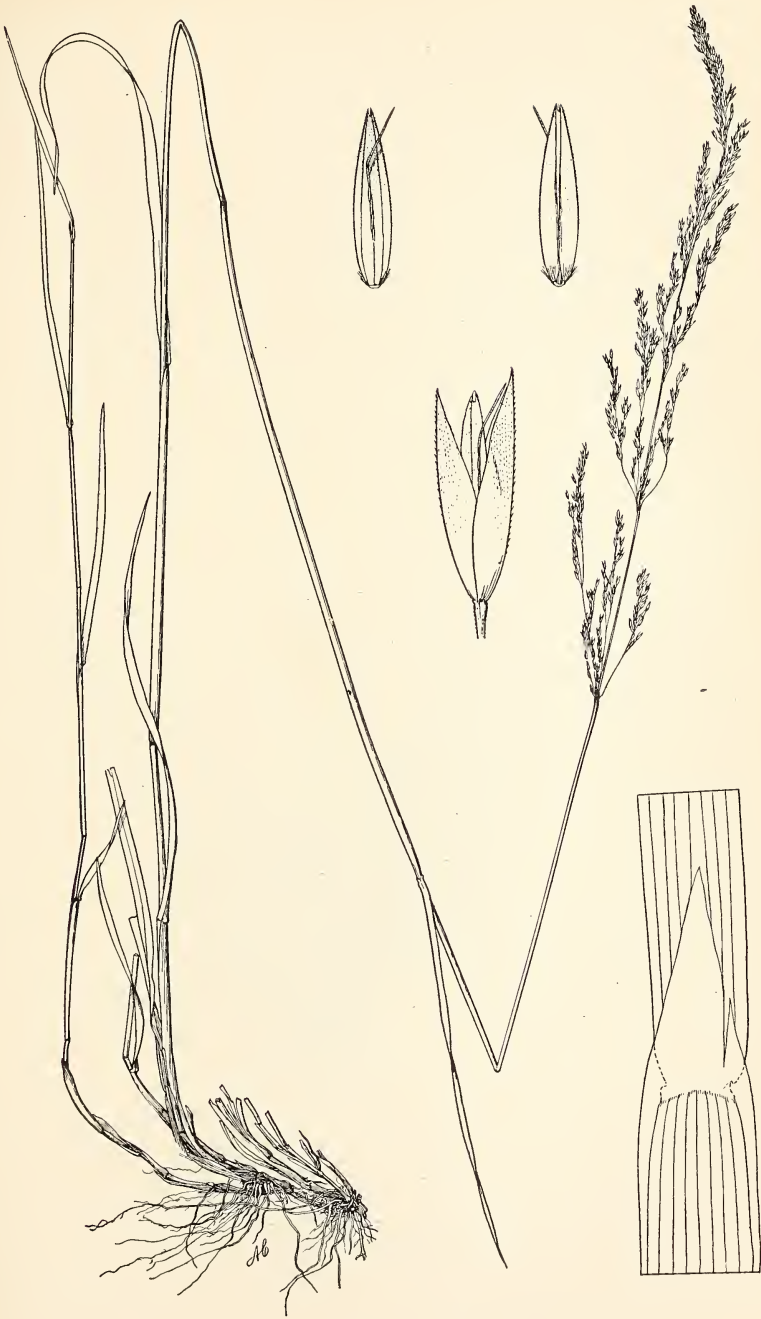


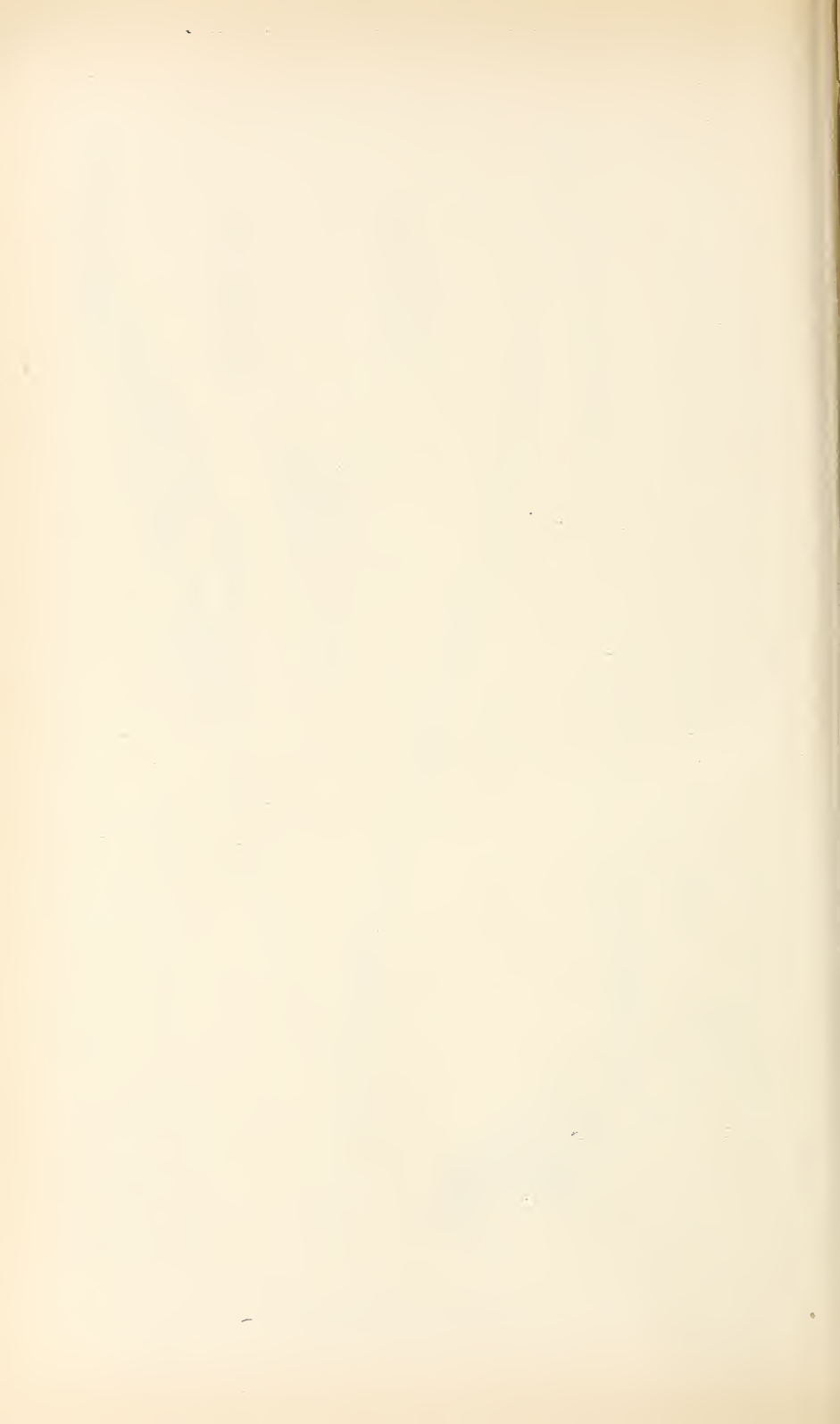
FIG. 1.—*AGROSTIS PALLENS FOLIOSA* (VASEY) HITCHC. (SLENDER FORM).  
FIG. 2.—*AGROSTIS SCOULERI* TRIN.

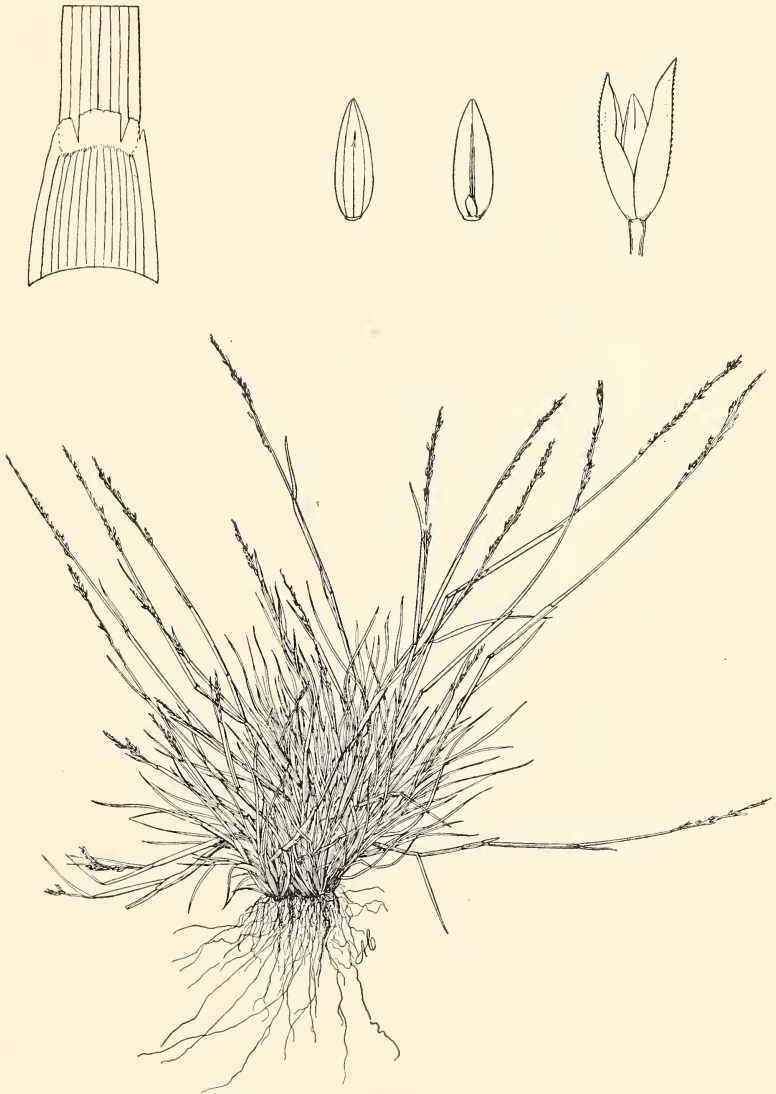






AGROSTIS DIEGOENSIS VASEY.





AGROSTIS BREVICULMIS HITCHC.



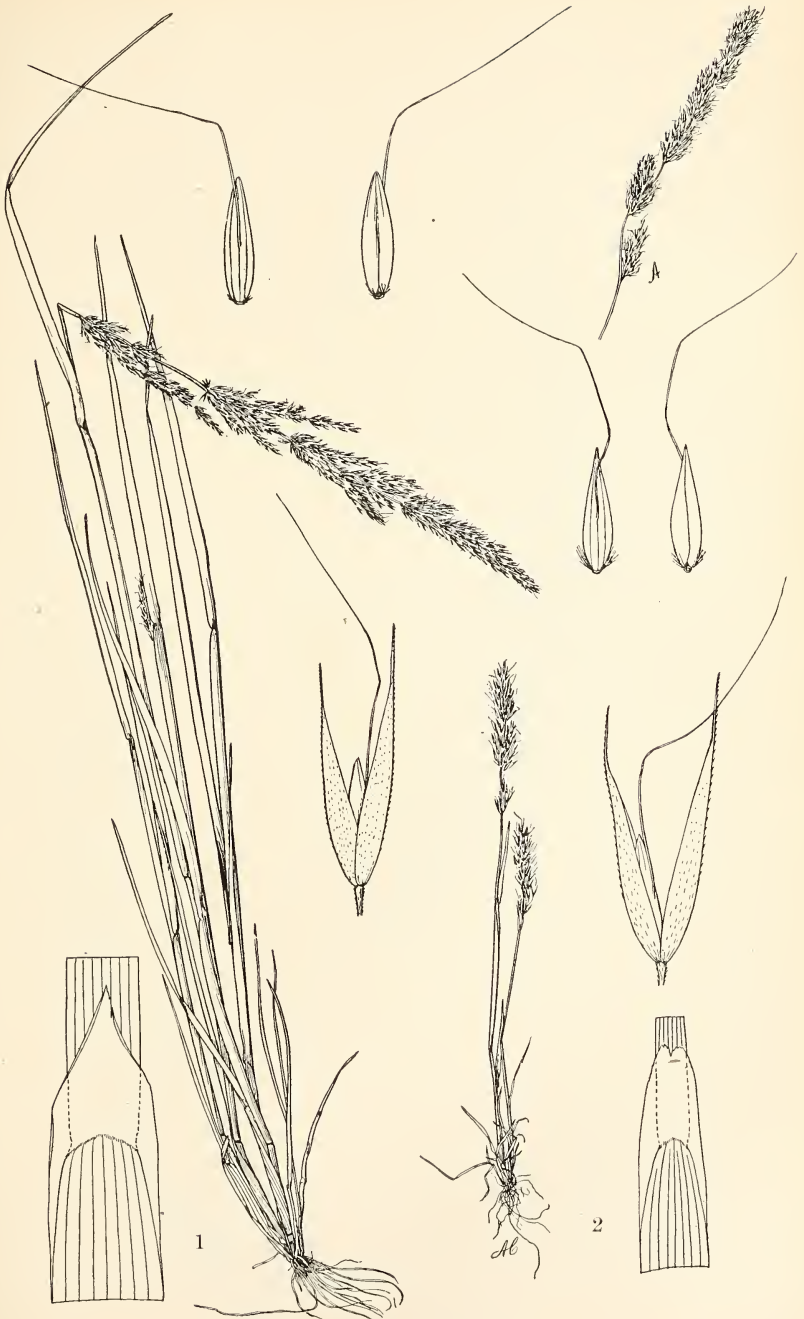
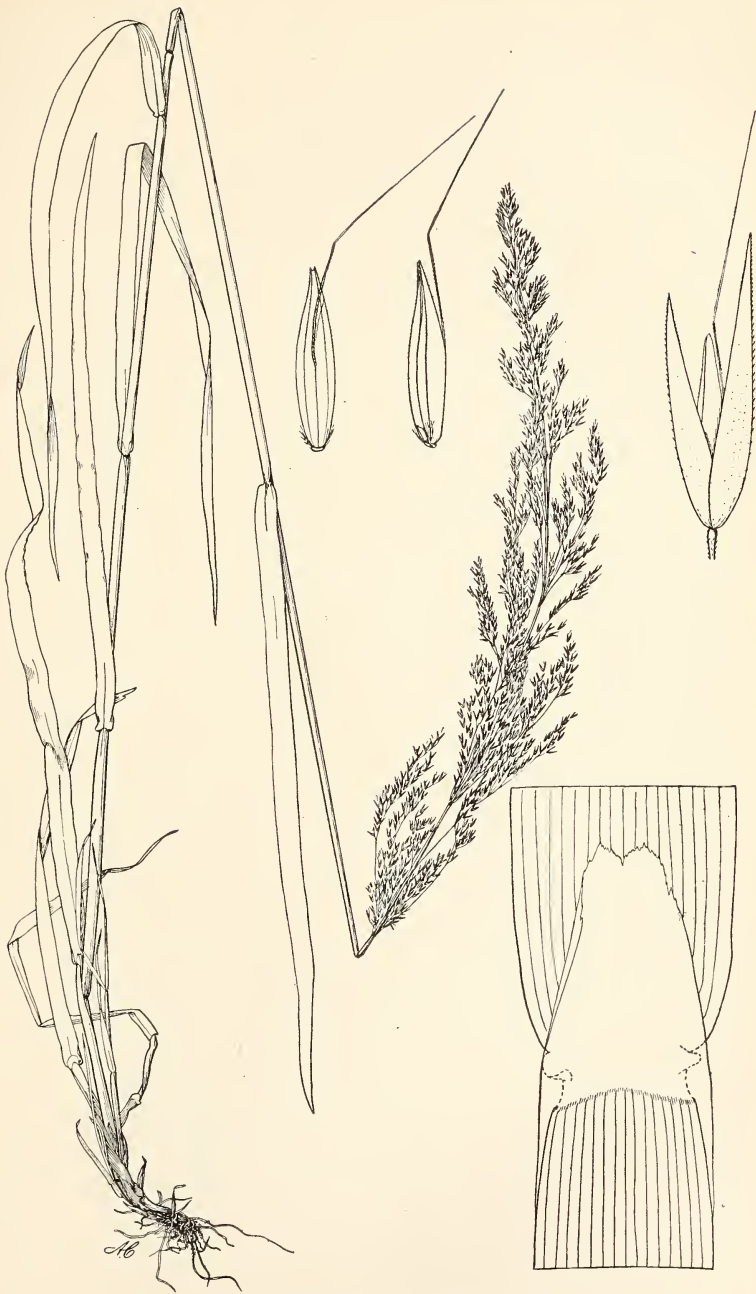


FIG. 1.—*AGROSTIS MICROPHYLLA* MAJOR VASEY. FIG. 2.—*AGROSTIS MICROPHYLLA* STEUD.





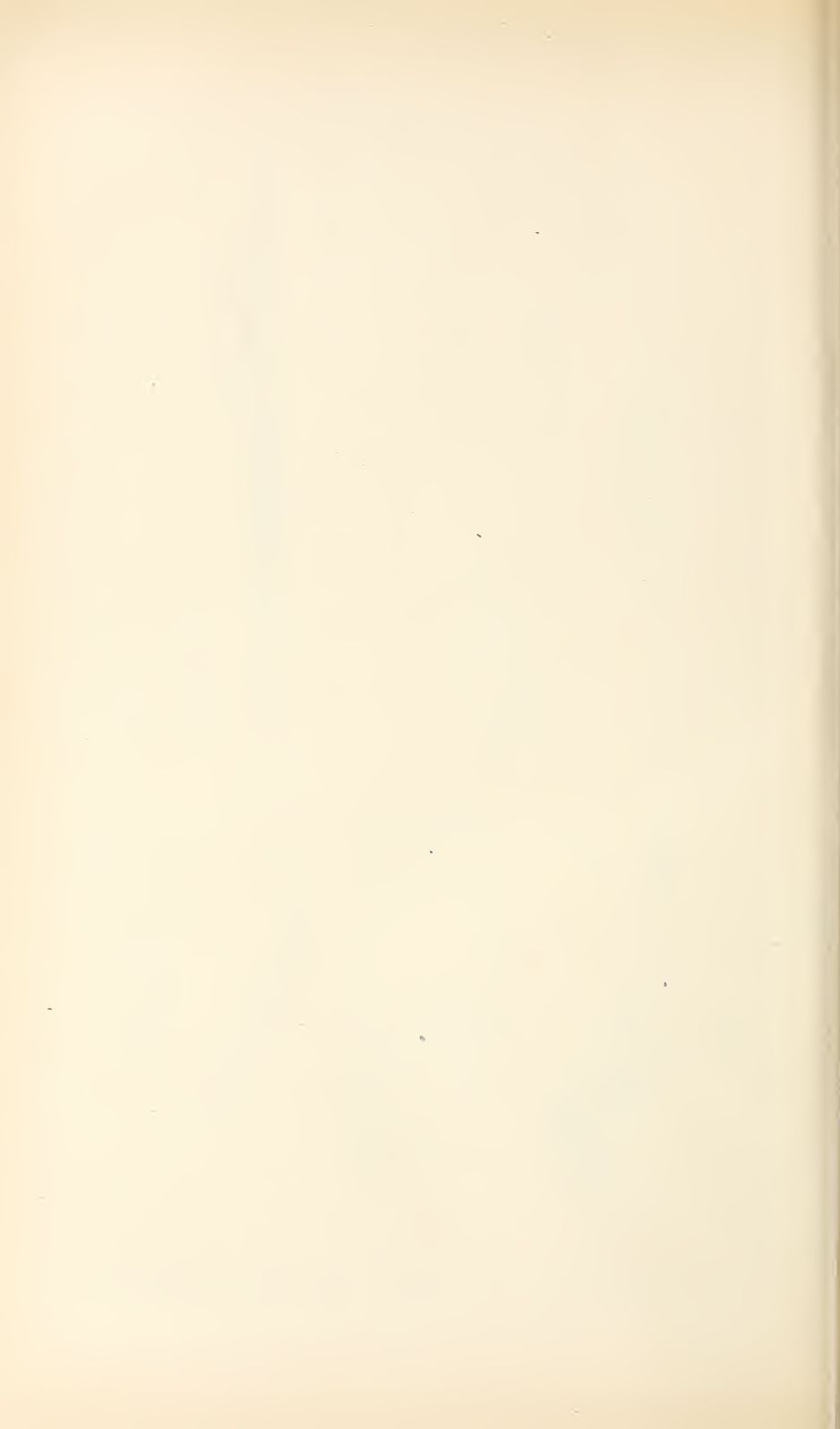


AGROSTIS AMPLA HITCHC.





FIG. 1.—*AGROSTIS EXARATA* TRIN. (ALASKA). FIG. 2.—*AGROSTIS ASPERIFOLIA* TRIN.







AGROSTIS GRANDIS TRIN.





AGROSTIS EXARATA TRIN.



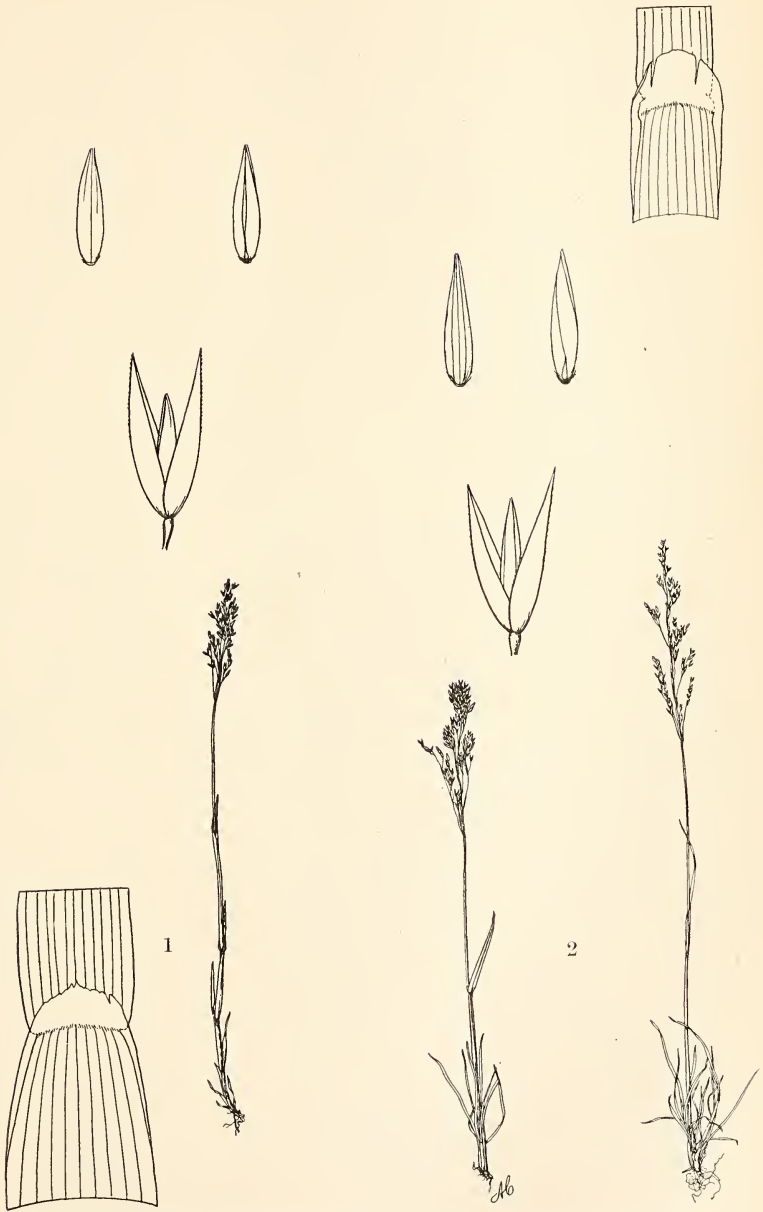


FIG. 1.—*AGROSTIS ROSSÆ* VASEY. FIG. 2.—*AGROSTIS VARIANS* TRIN.







AGROSTIS HOWELLII SCRIBN.



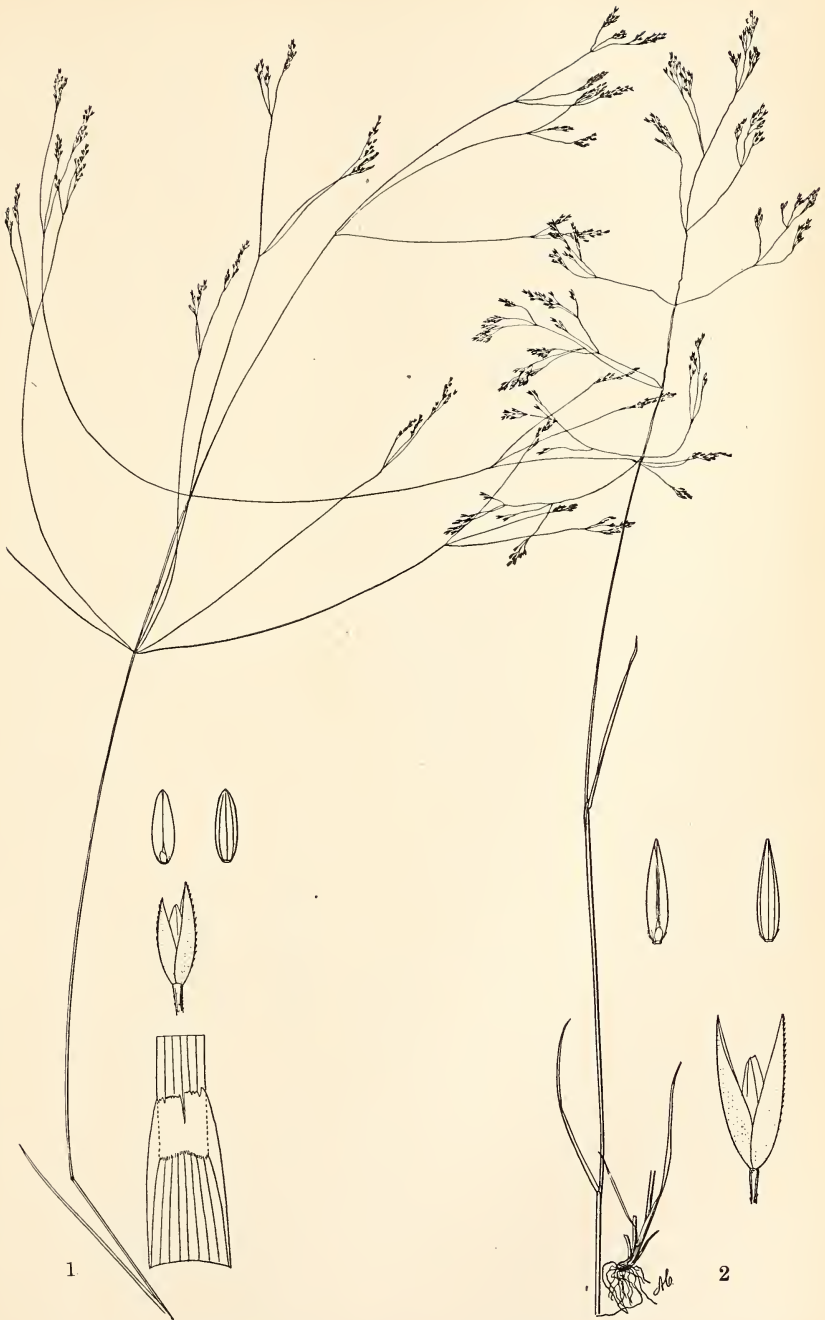
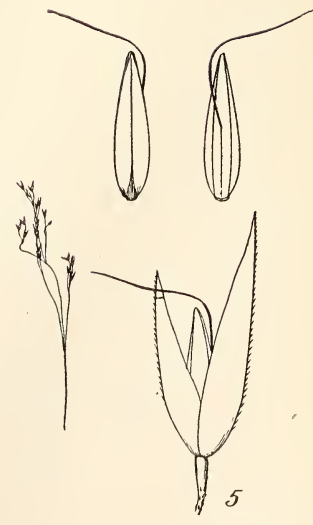
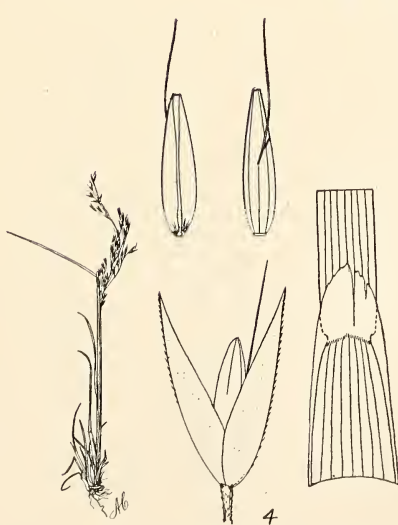
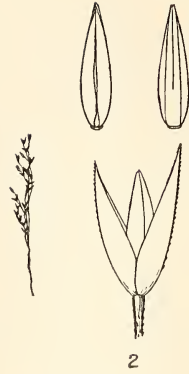


FIG. 1.—*AGROSTIS HIEMALIS* (WALT.) B. S. P. (COMMON FORM). FIG. 2.—*AGROSTIS HIEMALIS* (MOUNTAIN FORM).







TYPES REFERRED TO *AGROSTIS HIEMALIS* (WALT.) B. S. P.



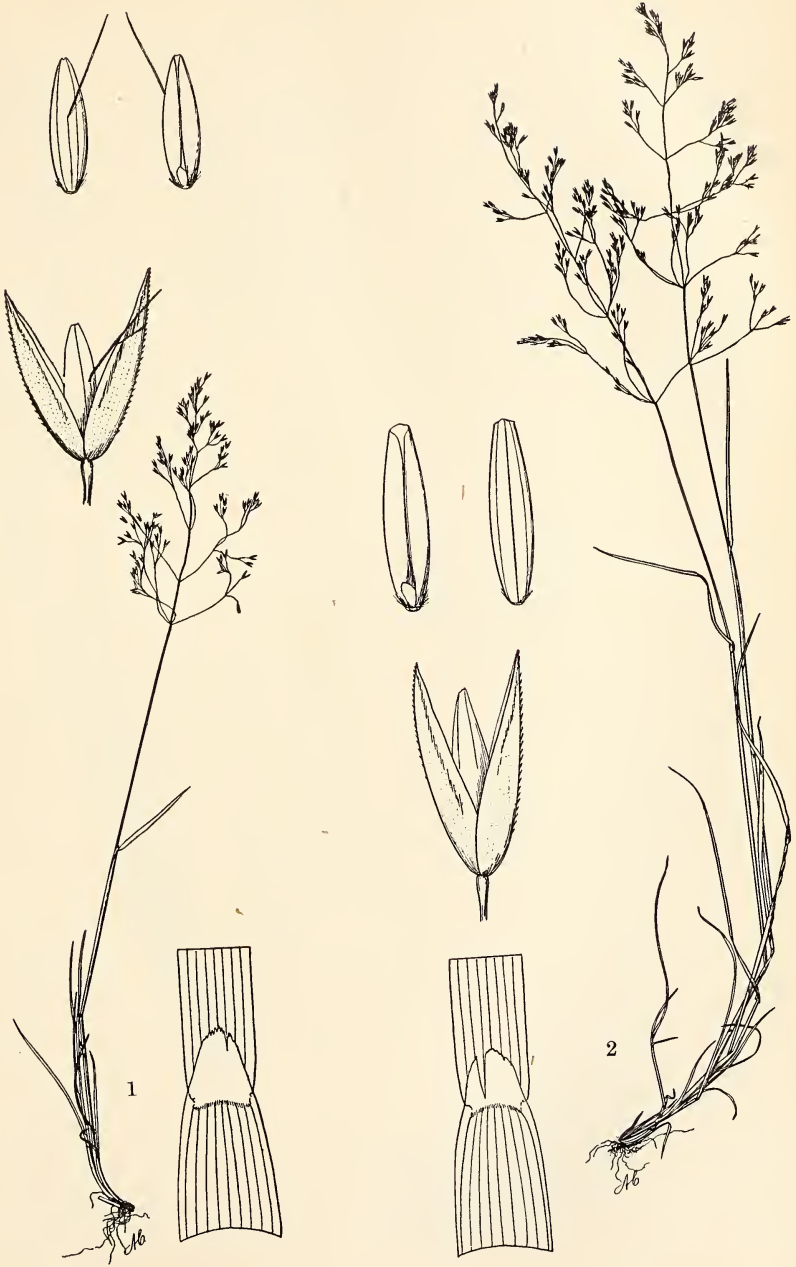


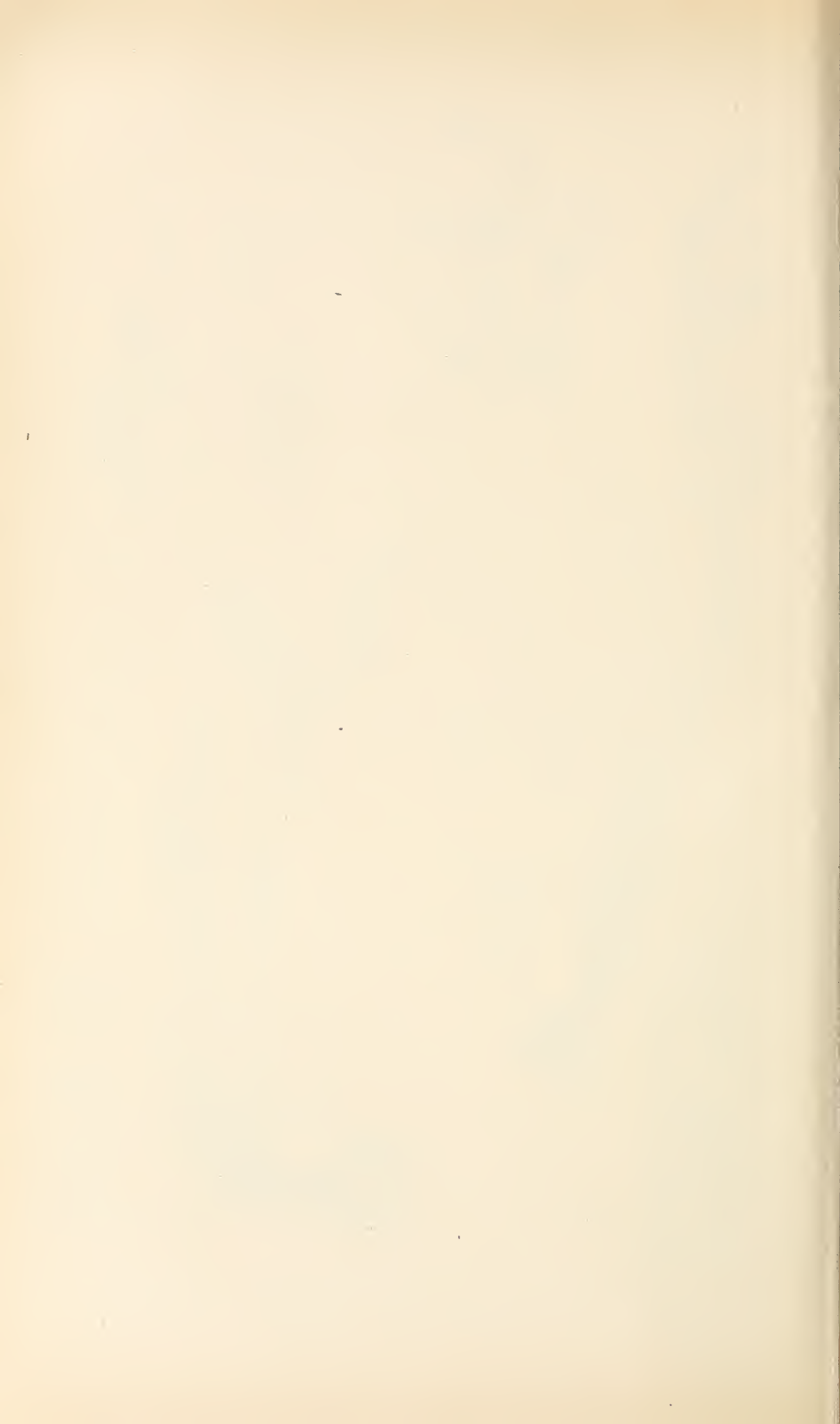
FIG. 1.—*AGROSTIS GEMINATA* TRIN. FIG. 2.—*AGROSTIS GEMINATA* TRIN. (AWNLESS FORM).





FIG. 1.—*AGROSTIS IDAHOENSIS* NASH. FIG. 2.—*AGROSTIS TENUIS* VASEY.

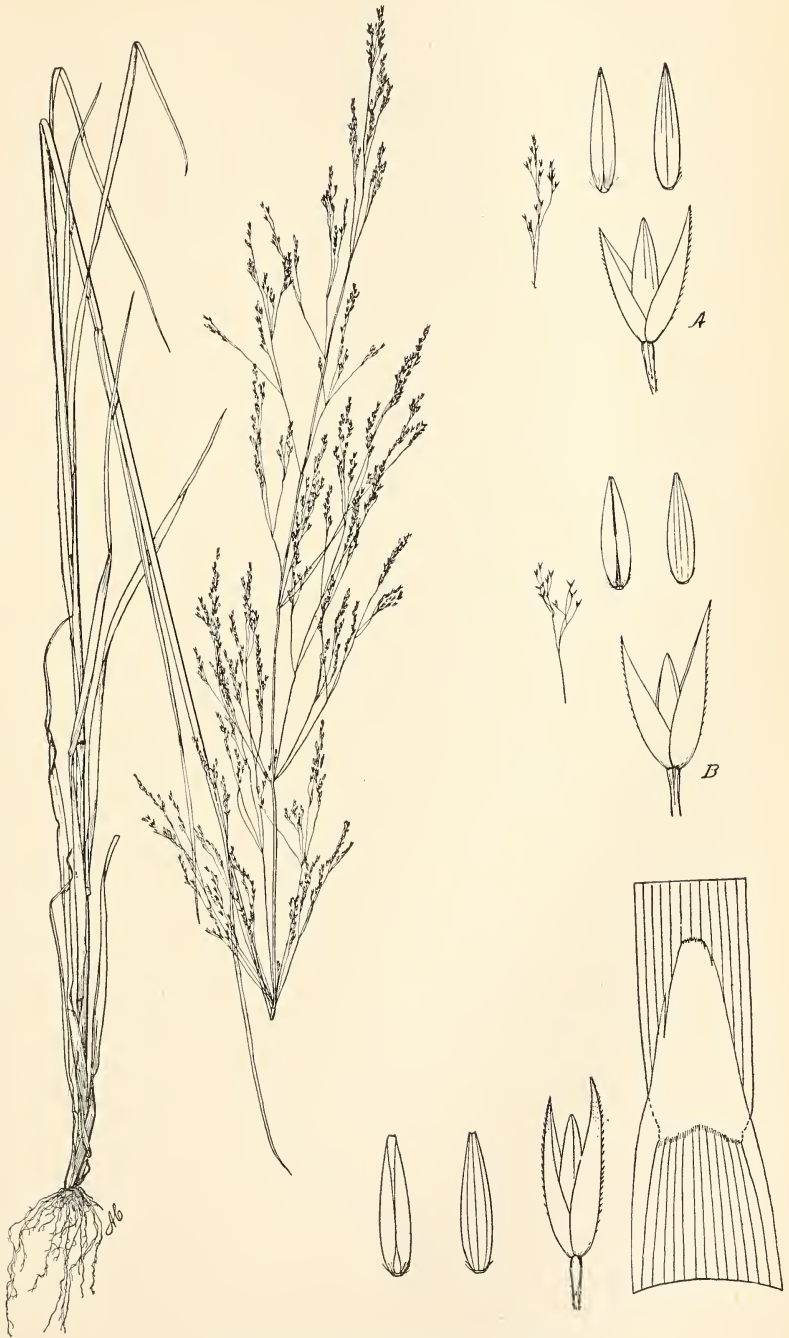






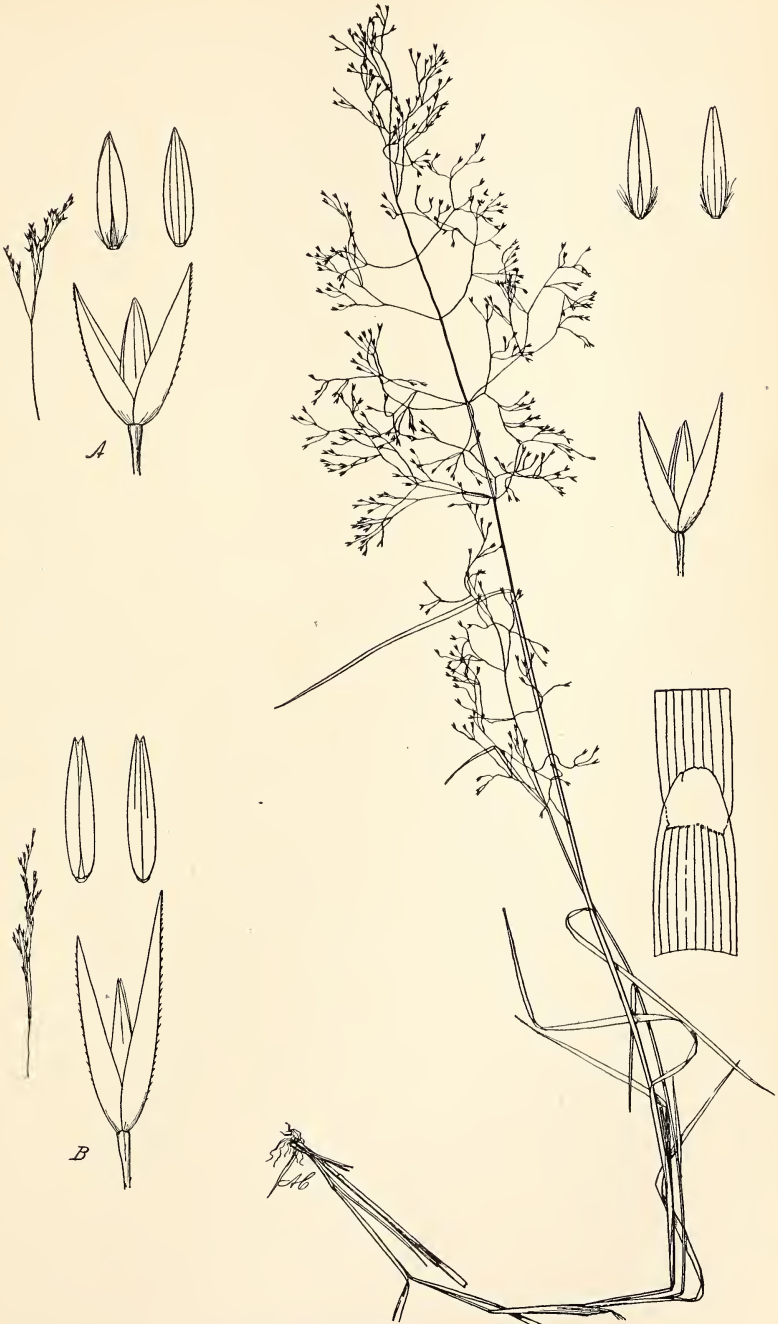
AGROSTIS SCHIEDEANA TRIN.





AGROSTIS PERENNANS (WALT.) TUCKERM.

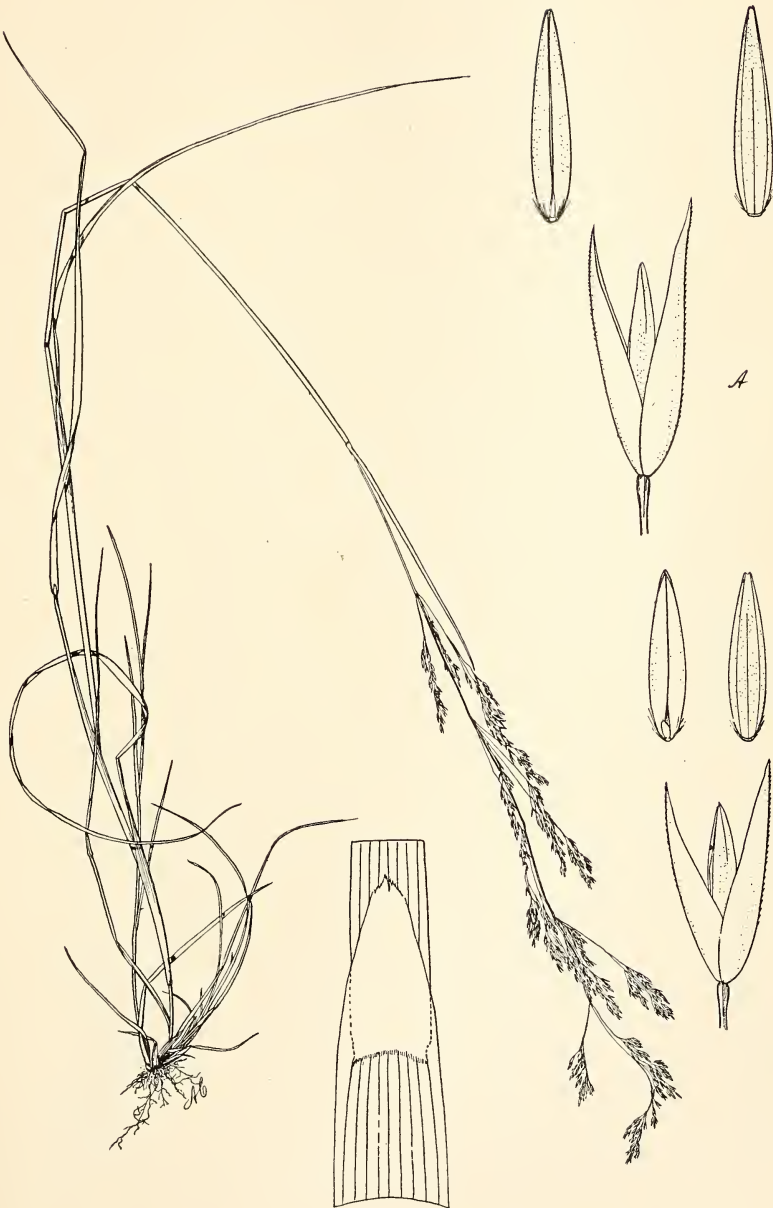




AGROSTIS PERENNANS ÆSTIVALIS VASEY.







AGROSTIS PERENNANS ELATA (PURSH) HITCHC.



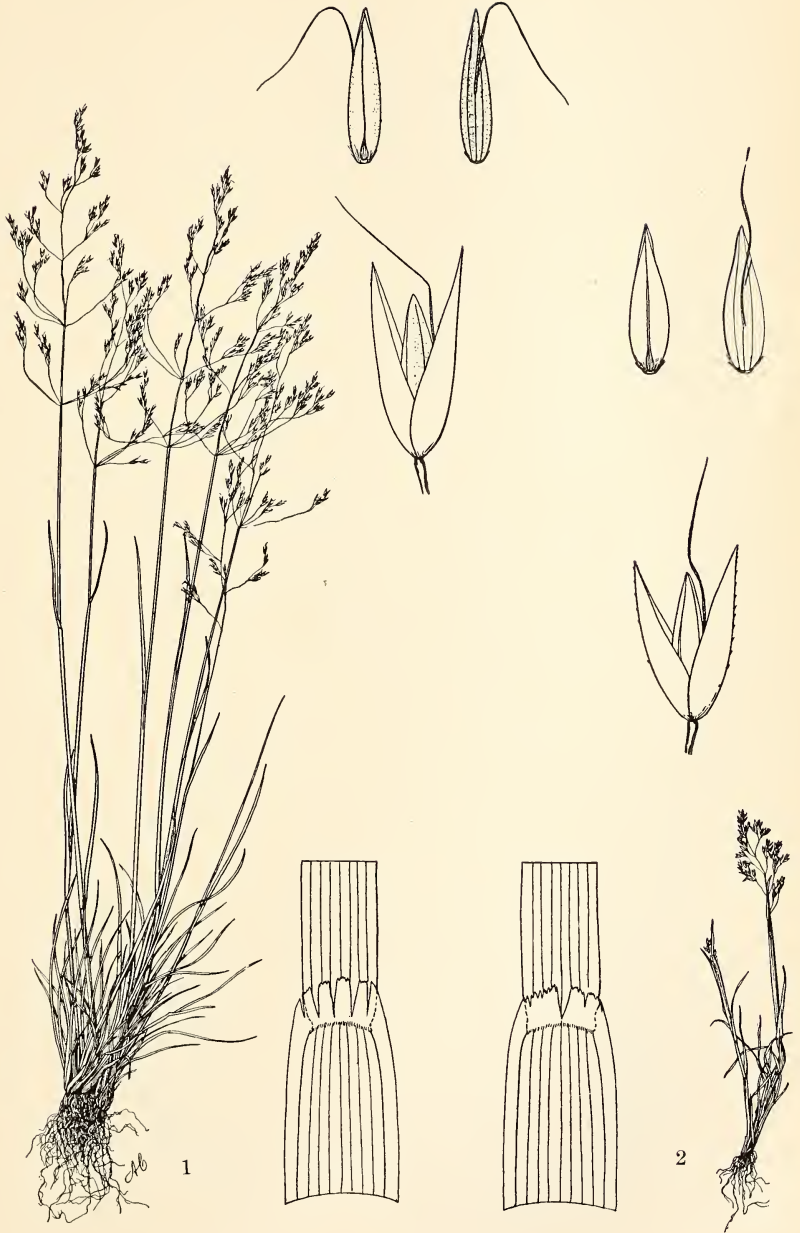


FIG. 1.—*AGROSTIS BOREALIS* HARTM. (WHITE MOUNTAINS). FIG. 2.—*AGROSTIS BOREALIS* HARTM. (LABRADOR).



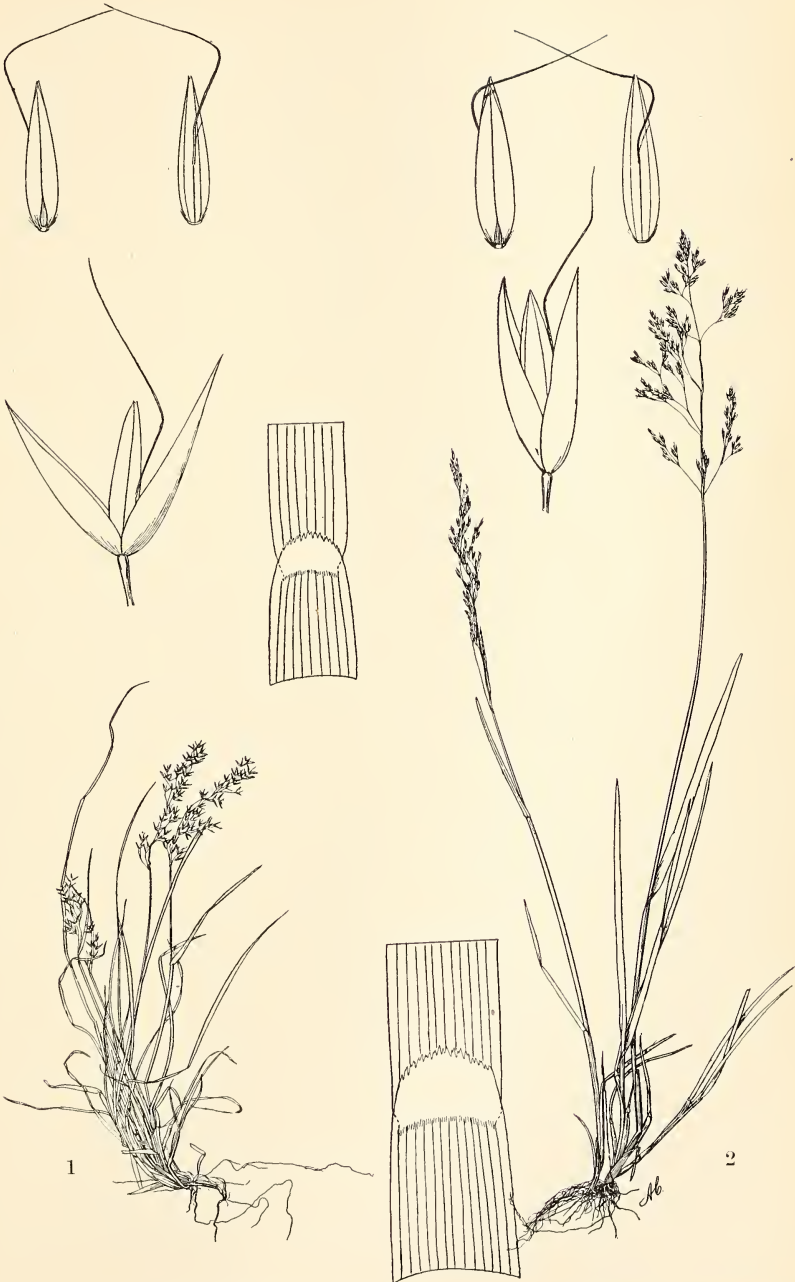


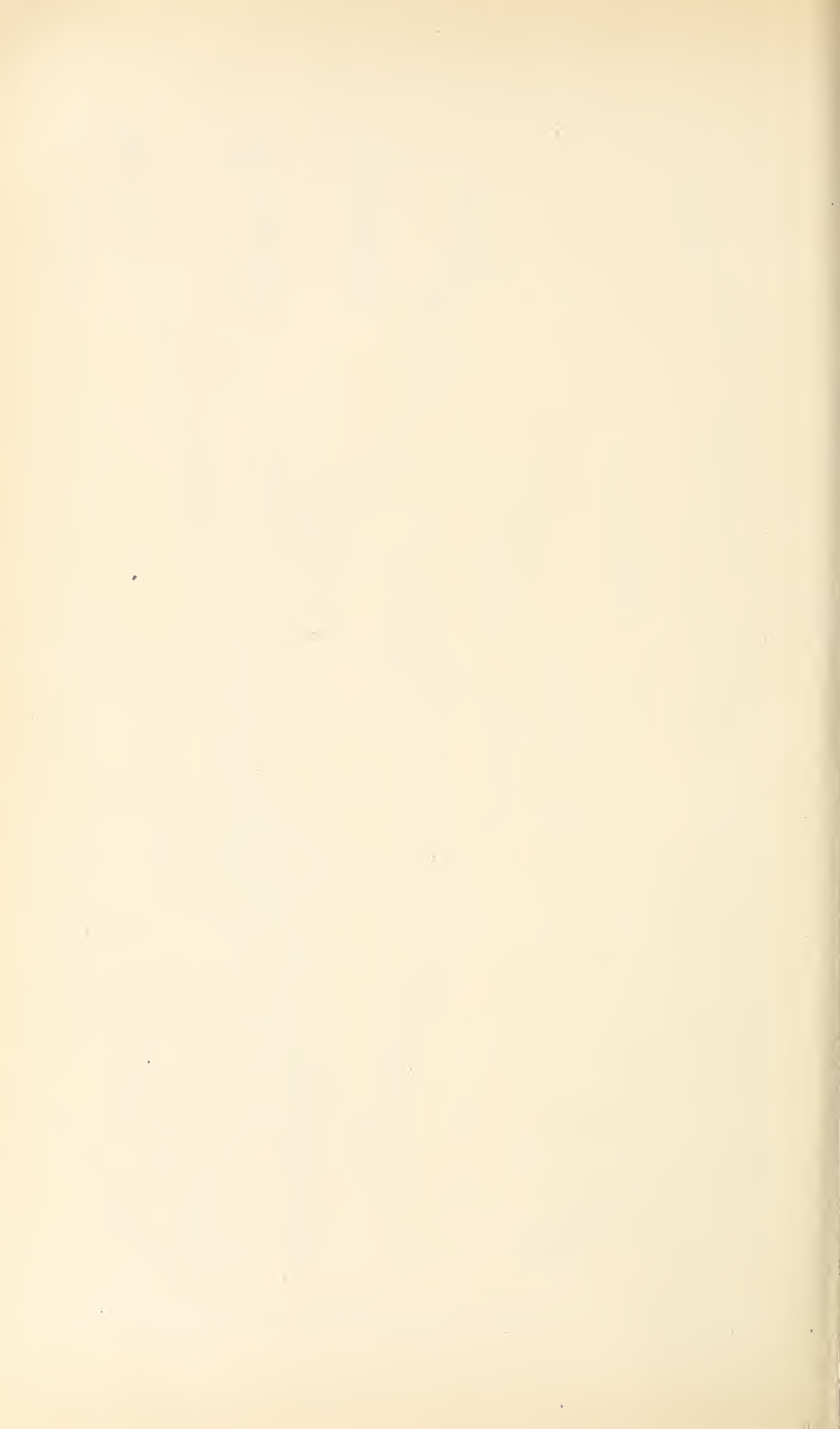
FIG. 1.—*AGROSTIS MERTENSII* TRIN. FIG. 2.—*AGROSTIS BOREALIS* HARTM. (SWEDEN).

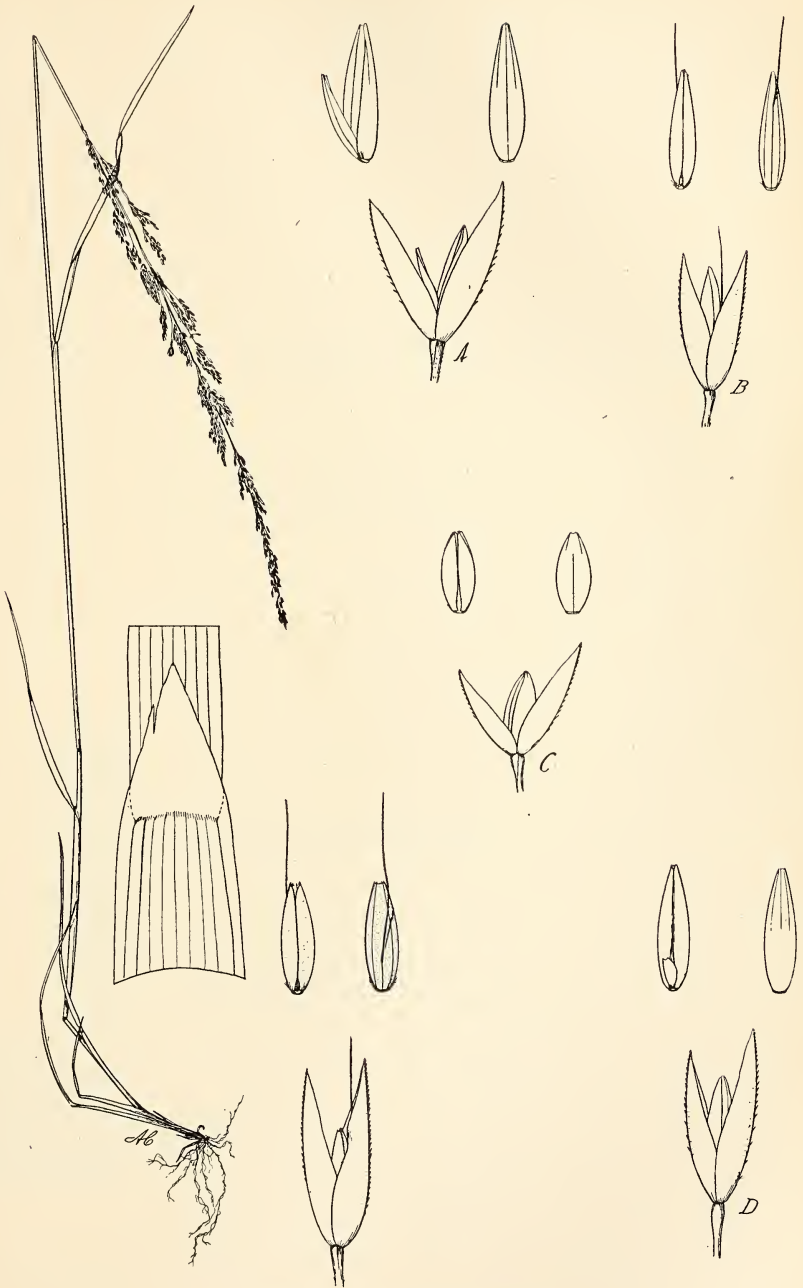






FIG. 1.—*AGROSTIS AENEA* TRIN. FIG. 2.—*AGROSTIS AENEA* TRIN. FIG. 3.—*AGROSTIS LONGILIGULA* HITCHC.





MEXICAN SPECIES OF AGROSTIS.

